

THE LARYNGOSCOPE.

VOL. XIX. ST. LOUIS, MO., SEPTEMBER, 1909. No. 9.

ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding
that they are contributed exclusively to THE LARYNGOSCOPE.)

LIPOMA OF THE LARYNX.*

BY M. A. GOLDSTEIN, M. D., ST. LOUIS.

Of all neoplasms occurring in the larynx, perhaps none have been so infrequently found or reported, as lipomata. The occurrence of an unusually interesting and instructive case of this character gave me the occasion and the impetus to investigate the literature of this subject, and I have taken as my task not only the minute description of my own case, but also a careful investigation of all authentic cases thus far reported.

At the outset, permit me to offer a criticism which may be considered justifiable, not only in the present instance, but in much of our laryngological literature. Those of us who have often made extensive search in the various journals, archives, and text-books of our specialties, must surely have been impressed with the many inaccuracies, discrepancies, and erroneous quotations and statements which often make our recorded subject-matter an unwieldy and unintelligible tangle. I cannot refrain from incorporating as an introductory paragraph to this monograph, the remarks of McBride, who, it seems, had similar difficulties nearly twenty years ago in his literary researches concerning lipoma of the larynx. He says:

"I should like to turn aside for a moment to point out certain discrepancies which I have discovered in my literary researches concerning a subject so limited that one might at all events expect, from those who consider themselves authorities on laryngeal diseases, an approach towards approximate accuracy. Eppinger (*Pathologische Anatomie des Larynx und der Trachea*, p. 205)

*Presented at the Fifteenth Annual Meeting of the American Laryngological, Rhinological and Otological Society at Atlantic City, N. J., June 4, 1909.

quite correctly mentions the three examples which had been observed up to the year 1880,—to-wit, those of Wagner, Tobold and Bruns. With regard to Wagner's case, he gives the reference as *Archiv. fur Prakt. Heilkunde*, 1872, p. 108, and states, in a somewhat aggrieved tone, that the growth was as large as a hen's egg, and that there is no further account of its attachment and relation to the interior of the larynx." Now I have, shall I say, verified this reference, and found it in the corresponding part, not of the *Archiv. fur Prakt. Heilkunde*, but in the *Archiv f. Heilkunde*, (1872, p. 108), and I have further found that the lipoma referred to was attached "by a thin broad base to the middle line of the tongue and anterior part of the epiglottis." This growth, I may add, was found in the body of a girl of 13 who had died of smallpox, and Wagner further mentions that she was to have been operated upon by Wendt. From this we may, I presume, infer that no immediately urgent symptoms existed. Eppinger also mentions Tobold's case as being described in the *Archiv f. Prakt. Heilkunde*, 1872, p. 422. I do not know whether such a journal exists, but the *Archiv. f. Heilkunde* (in which the preceding case was found) does not, at the page named, contain any reference to a lipoma of the larynx. So much for Eppinger's accuracy. But if we now turn to Schrotter's paper ("Ueber das Vorkommen von Fettgewebe im Larynx," *Monatsschrift fur Ohrenheilkunde*, June, 1884), we find exactly the same inaccuracies repeated. In Gottstein's work the erroneous references are not reproduced, possibly because no exact references are found in the book, but it is expressly stated that in Wagner's case the point of attachment is not given, showing that no attempt could have been made to verify his statements (*Die Krankheiten des Kehlkopfes*, 1888, p. 149). Now, as I cannot find Tobold's case described by any other authors than those referred to, it is not surprising that I know little about it, and that also, for obvious reasons, I refrain from reproducing what little is mentioned by these authorities. I have no desire to act the part of a captious critic, but the evil illustrated by my investigations into a subject so limited as lipoma of the larynx is, I believe, widespread. Authors are too apt to follow each other like sheep without verifying data, and thus, instead of perpetuated truth we have perpetuated error. To grasp the whole of medical science is impossible for one man, but, on the other hand, it is not too much to ask of those who would be our instructors and pioneers that they should first instruct themselves."

I have personally verified all of the references above mentioned and concur in every particular with the statements of McBride.

The etiology of lipomata of the larynx is quite obscure. There are three possible etiological factors to be considered.

First: The development, by simple hyperplasia of distinctly independent or encapsulated fat masses from fat cells or small areas of adipose tissue.

Chiari, in a recent discussion with me on this subject, states that he has observed fat cells in the microscopic examination of serial sections of the normal larynx at about the plane of the ventricular fossa.

There is, perhaps, no cavity, endothelium in character, where adipose tissue or fat cells are normally so infrequent, as in the larynx.

In several of the reported cases, as well as in the author's case there is, because the existence of the growth was known to the patient for many years, a possibility of a congenital origin and hyperplasia of fat tissue.

Second: The possibility of an embryologic origin of tissue favorably disposed to such fat development must not be lost sight of. The invagination of a single cell of the mesoderm may offer the first nucleus for the development of such a fatty metamorphosis in an area normally free from fat.

In the case of von Bruns, the microscopic examination of which has been minutely reported, reference is made to a small piece of white cartilage of the size of a hemp seed, contained in the apex of the tumor and completely surrounded by connective tissue. Teratomata, in the light of cellular pathology, have their origin that way; why not lipomata?

Third: The most recent theory of cell-metamorphosis and cell-proliferation, as advanced by Gideon Wells in his chemico-pathology, may have a very pertinent bearing on fat origin in this class of neoplasms. Jonathan Wright actively supports this theory in his report of the pathological examination of the author's case.

Dr. Wright states: "To me the special interest in the growth, as lipoma is the commonest of the benign tumors elsewhere than on the mucosa, is the consideration of its etiology. I doubt if it is permissible to place it in the usual category of benign tumors, which have a more or less evident affiliation with the hyperplasias of inflammation and local hypernutrition, though I suppose, fundamentally, the forces lying behind the phenomena are parallel ones.

"Here it seems to me, in the lipomata, it is not a question of cell-division of some element in the tissue as in a fibroma, or an osteoma,

or an adenoma. It is not a question of like breeding like. We are concerned (1), with a chemical change per se, or, (2) we are concerned with some physical disturbance of equilibrium whereby lipid material ceases to be changed into something else, and (3) accumulates in the connective tissue cells. In other words, we have, (1) the conversion of albumen into fat, a thing as yet, so far as I know, not demonstrable in the test tube, or (2), we have some specific increase in the surface tension of connective tissue cells whereby oil globules are *adsorbed* and *absorbed*, or, (3), and I believe this to be the more probable, we have some disturbance of the chemistry of the cell in a fibrous hyperplasia whereby the action of a ferment is suspended, which, under normal conditions, converts the lipid material into waste products and perhaps into protoplasm. This view, I think, would account for the presence of fat in various tumors, especially those undergoing a retrograde metamorphosis.

"Essentially, therefore, I think a lipoma is a fibroma and not an independent tumor. In the sections from your specimen, while exhibiting more fat globules and less connective tissue than any of the lipomata of the mucosa I have examined, they nevertheless present considerable differences in different localities as to the amount of fibrous tissue present. It is merely a matter of degree. In Dr. Hinkel's case, the tumor repeatedly recurring, each time with varying amount of fat globules, is thus comprehensible. The fatty turgidity of these tumors of which I spoke in my other letter, I think, is especially significant of the views I have here developed. The smooth, semi-erectile state which is the cause of their frequently striking clinical appearance, is due to the strong affinity developed in the surface tension of the component connective tissue cells for fat. It is probably attracted from the circulation by this abnormal affinity, not metamorphosed as usual, but instead, stored up in, or in contact with the connective tissue cells having this pathological affinity and this local fault of metabolism.

"I hope I have made my meaning clear and that it will interest you in connection with your rare growth."

Pathologically, no definite form of growth of lipomata in the larynx have been determined. The case of Jones was a long pendulous neoplasm, attached by a thin, flat band. The cases of Golbek and v. Schroetter were of the multiple variety, scientifically classified lipoma arborescens. The microscopic report of Farlow's case is that of polypoid lipoma.

Several of the cases included in this classification are fibro-lipomata, or mixed-tissue variety.

There seems to be no limitation to the size or shape assumed by these neoplasms; lipoma ordinarily grows slowly and it may be readily assumed that where no aggravating symptoms occur, such neoplasms can grow for many years without seriously impairing the health, or physiological relations of the patient.

In Holt's case, reported as early as 1854, the patient died suddenly from suffocation, and the character of the growth was determined on the post-mortem table. This case had evidently existed for a long time, and the long period of growth may be attested by its unusual size and pendulous shape. McBride's cases were both of large size, measuring $1\frac{1}{2}$ to 2 inches in their long diameters. Koehler's case was of similar diameter.

The age of the patient in which lipoma of the larynx occurs, ranges from that of a girl of thirteen years of age (Wagner's case), to that of a man of 80 years of age (Holt's case). This form of neoplasm seems to occur with equal frequency in both male and female.

The point of attachment also has a wide variation. The cases of Holt, McBride, and Koehler, were attached by small pedicle, or thin, flat band to, or near to the base of the epiglottis. The cases of v. Bruns, Golbek, and Schroetter were attached by broader base to the ary-epiglottidean area and around the surface cartilages of the larynx.

McBride's second case had its attachment by a narrow pedicle in the right sinus pyriformis. My own case was attached by a thin, flat band to the lateral wall of the ventricular fossa.

It is a point of some interest that the several cases of pure lipomata were attached by slender pedicles, or narrow bands, while the neoplasms of mixed variety, as the fibro-lipoma, and the lipoma arborescens, had a broader base of attachment.

Recurrences after removal are reported by v. Bruns, McBride, Golbek, and Hinkel. In each of these cases it may be observed that the neoplasm was not completely extirpated, and that rapid recurrence took place at the site of the former growth. The original growth in each of these cases was slow; the recurrence was rapid.

Of the twelve cases reported, three were discovered after reaching the post-mortem table; of this series of cases, six were successfully operated on by the endo-laryngeal route. Golbek's case, one

of extensive lipoma arborescens, was operated by preliminary tracheotomy and sub-hyoid laryngotomy. Apalvin's case was one of sub-hyoid pharyngotomy.

The favorite instrument for endo-laryngeal operation was the galvano-cautery snare; the cases of Hinkel, Farlow, McBride and my own were operated by the cold wire snare and subsequent use of traction and long curved scissors, the wire snare having become caught or broken.

This form of neoplasm in the larynx has occurred so infrequently that it is rather difficult to draw any definite conclusions from the reported subject matter. In a general way we may be justified in stating that lipoma may be present in the larynx for a long time without causing aggravating symptoms, or impairing the general welfare of the patient. In fact, this neoplasm may be present without the patient's being conscious of it until it is gradually increased in size, and produces symptoms of pressure or obstruction.

There is a tendency for lipomata in the larynx to recur, unless the removal or extirpation of the mass be complete. The original growth is slow; the recurrence after imperfect removal, is rapid.

The prognosis is generally good and especially favorable in the pure lipomata, where attachment is by small pedicle, or narrow band.

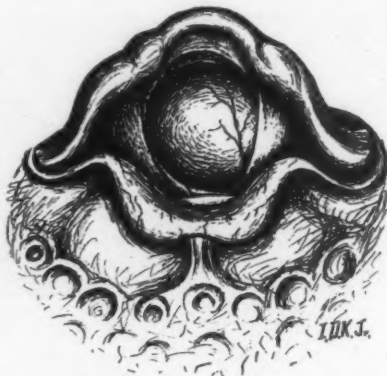
REPORT OF AUTHOR'S CASE.

Mrs. P. D. P., white, married, thirty-three years of age, was referred to me by Dr. W. G. Moore of St. Louis and Dr. J. P. Baker, of Salisbury, Mo. On October 25th, 1908, I was called to the hospital to see the patient and found her in a somewhat recumbent position, lying well over to the left side, propped up by her left elbow and by pillows; her head hanging, with her chin towards the left shoulder. The patient showed evidences of extreme physical depression; complexion sallow; skin moist and clammy; pulse thready, rapid, but regular; tongue flabby and thickly coated; respiration shallow, labored, irregular; accompanied by marked stridor.

It was evident at the outset that the principal complaint of the patient was the difficulty in respiration.

No detailed examination was attempted until the following day. Dr. Moore made a physical examination and reported the heart and lungs normal, sputum negative, for t. b. c.; urine of normal specific gravity and negative in reaction for albumen and sugar.

On October 27th, 1908, I made a laryngeal examination and found a large, rounded, pale yellowish-pink mass, completely filling the glottis, extending from the left lateral wall of the ventricular fossa, pushing the ventricular band upward and overlying both vocal cords. Owing to the unusual size of this mass and its extreme convex surface, the left ventricular band was stretched and arched abnormally upwards, so that it appeared almost in a line with the left arytenoid cartilage. In the convex glistening surface of the tumor a considerable capillary net-work of vessels can be seen. The growth occupied the entire lumen of the glottis when the patient sat in an erect position, with the exception of a small chink anteriorly between the globular tumor mass and the right vocal cord. Respiration in this position was almost impossible,



Author's Case. View of neoplasm by direct inspection.

for the weight of the tumor closed the glottis as completely as a well-fitting ball-valve.

With a probe the tumor was outlined with some difficulty, and its attachment located in the left ventricular fossa. Owing to the firm resistance to the manipulation of the probe during this tactile examination, it was assumed that the attachment was by a rather broad and extensive base.

It was observed that the patient leaned the head and neck towards the left side to obtain relief from dyspnoea and that she had practiced this position for many months, unconsciously, in which the difficulty in breathing had become marked.

Digital examination of the neck externally revealed the large rounded mass, felt most definitely in the left cricothyroid space. There was appreciable movement of this mass under the fingers during every act of deglutition. No glandular enlargements of any kind were found, nor were any other data presented as the result of this examination.

The patient gave the following history:

During childhood had severe attack of measles and chicken-pox; a slight attack of scarlet fever. At six years of age had an intense attack of whooping-cough and according to the statement of the patient, these paroxysms of coughing, resembling whooping-cough in character, have recurred with uniform intensity and regularity every winter. The patient has been very susceptible to

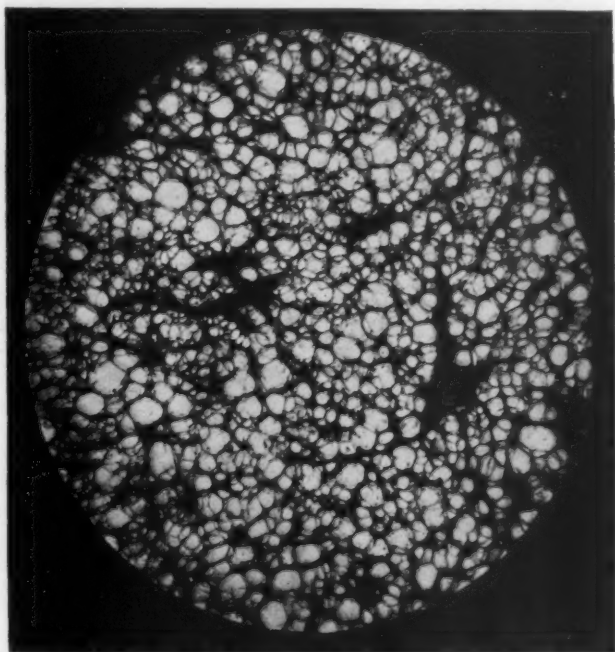


Author's Case. Multiple lipoma of the larynx. Photograph of tumors taken immediately after operation, illustrating natural size of neoplasms, size, shape and capsule.

"colds," attacks of "la grippe" and subsequent laryngitis from childhood up to the time of her present illness. Prior to her marriage she was a teacher, for a number of years, of vocal culture and Delsarte.

The development of the present trouble seems to have been a gradual one; the tone of the voice was peculiar, and has been gradually though constantly, changing in character and volume. There was never complete aphonia, but hoarseness occurred in later years, with increasing frequency. There was pain and discomfort only when "colds" were contracted; breathing has become more labored in the past few years and especially aggravated during over-exertion, or nervous irritation. In the last few months the most marked sensation was a choking tendency and difficulty in breathing.

No evidence of tuberculosis, but grandfather and great-grandfather on father's side died of cancer; two brothers and two sisters died with throat affections following scarlet fever; the character of these infections could not be more definitely determined. There seems to have been an unusual predisposition toward affections of the throat in many members of the family. No other data in the family history, which may have a bearing on the present case, could be obtained.

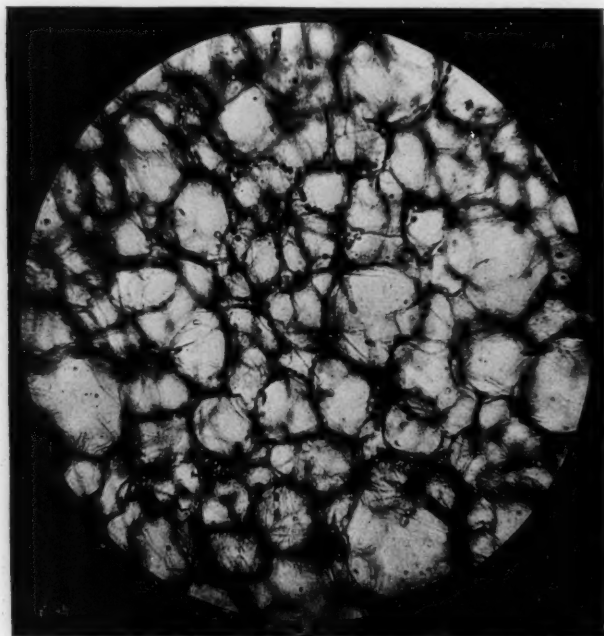


Author's Case. Photograph of microscopic section. (Low power).

A point to be especially emphasized in the possible etiology of this case is the fact that the patient has complained for a period of about fifteen years of almost constant discomfort in speech and respiration; two symptoms which have become more aggravated from year to year, culminating about six weeks before this examination, in marked dyspnoea, with change in position of the body, frequent paroxysms of coughing and marked emaciation, restless nights, nervous depression, inability to eat, or to digest properly.

On October 29th, the patient was taken to the operating-room, placed in a semi-recumbent position, and the pharynx and larynx anesthetized with a spray of 5 percent solution of cocaine and 1-2000 adrenalin chloride. The area about the neoplasm in the larynx was also swabbed with a 10 percent cocaine solution.

The exact nature of the growth could not be definitely determined by its macroscopic appearance, nor by examination, other than that it seemed entirely encapsulated, was soft and elastic to



Author's Case. Photograph of microscopic section. (High power).

the touch, as determined both by the probe and the finger, and some small branching vessels were noted on the superior surface. I was unable to determine whether the attachment of the tumor was by a small pedicle, or by a broad, flat insertion; I was fairly certain, however, that this attachment was somewhere along the lateral wall of the left ventricular fossa.

There was some discussion as to what operative technique to pursue; namely, whether the attempt should be made to remove the

growth by endo-laryngeal route; by laryngotomy, or by sub-hyoid pharyngotomy. In the case of a fibroma, or any form of neoplasm, with abundant vascular supply, considerable risk of hemorrhage was to be assumed, if operated upon endo-laryngeally.

My preliminary preparations for the operation included all necessary equipment for the prompt performance of either tracheotomy or laryngotomy. I used a curved laryngeal cannula and Krause snare, threaded with a loop of No. 6 steel wire. This cold wire snare was passed around the tumor and at the first attempt the larger of the two growths was promptly removed. There was but very little bleeding and this was promptly controlled by an application of adrenalin. On inspection, after removal of this mass I was surprised to find another growth, almost equal in size to the one just removed, present in the forcibly enlarged ventricular fossa.

The patient was now given a hypodermic of strychnine and allowed to rest for five minutes. As the removal of the first growth had been accomplished with the cold wire snare so easily, I re-introduced the freshly looped cannula over the convexity of the second neoplasm. Again I was successful in engaging the growth at the first attempt, but in drawing the snare home, a portion of the capsule of the tumor, near the pedicle, must have been caught in the snare loop and an unlooked for complication arose. I was unable to disengage the snare and it was equally impossible to cut through the pedicle. Added to this, the patient became quite nervous and began to cough. I discarded the laryngeal mirror, reflected my head lamp directly into the larynx, made firm traction on the entire mass, pulling the snare, tumor, and larynx well forward and upward, and as soon as it came into direct view, cut off the pedicle with a pair of long, curved scissors.

The patient was immediately put to bed, there was no bleeding, no reaction, and no depression. Immediately after the operation, the patient could lie flat on the bed without discomfort, breathing was free, but there was considerable pain on swallowing. The patient was kept in bed for one week, fed on liquid and soft foods; subjected to constant vaporization in the room of compound tincture of Benzoin and Eucalyptol, and the throat sprayed at frequent intervals with a hot spray of Camphor, 2 grs.; Carbolic Acid, 2 grs.; Menthol, 3 grs.; Vaseline, 2 ozs. Recovery was prompt and uneventful.

Inspection of the larynx after the healing of the wound showed the left ventricle of Mogagni free, and the left ventricular band

restored to its normal plane and position. The vocal cords approximated perfectly and the voice lost the peculiar muffled character which had been noticed for many months. The exact band of attachment in the ventricular fossa could not be determined by laryngeal examination, as it seemed to be embedded deep in the lateral wall of this fossa.

At the present writing, seven months after the operation, the patient reports that she is in perfect physical condition. At the time of the operation she weighed 85 lbs.; her present weight is 127 lbs. All symptoms of cough, dyspnea, and other discomfort have ceased. I have had no opportunity of inspecting the larynx. Macroscopically the two tumors present identically the same appearance. To the touch they are soft and elastic, and each of the neoplasms completely surrounded by an independent capsule. The capsule of the larger and first removed of these growths contains a long slit, where it was no doubt attached to the convex surface of the second mass. The second of the growths has a similar and better defined pedicle. In the fresh state the vascular net-work embedded below the capsule could still be distinctly seen. The large specimen weighed 48 grs. ($3\frac{2}{10}$ grams), the smaller specimen weighed 46 grs. ($3\frac{7}{100}$ grams). The large specimen measured $1\frac{1}{3}$ inch in length, $\frac{7}{8}$ inch in width, and $\frac{11}{16}$ inch in thickness. The smaller specimen measured $\frac{11}{12}$ inch in length, $\frac{3}{4}$ inch in width, and $\frac{5}{8}$ inch in thickness.

The color was a pale, yellowish-pink; the capsule was smooth and glistening throughout.

The reports of the microscopic examination, for which I am indebted to the courtesy of Dr. Jonathan Wright, of New York, and to Dr. R. L. Thompson, Director of the Pathological Department of the St. Louis University School of Medicine, are here appended.

Dr. Jonathan Wright reports:

The sections from the part of the tumor selected for microscopic examination show a tissue almost exclusively made up of fat cells. These resemble in every way the ordinary fat cells of adipose tissue as it normally occurs, except possibly they are, some of them, a little larger. There are places where there are fibrous strands running through the microscopic fields, but they are much less abundant than is usually the case in lipomata. Around the fat globules there is a well-marked limiting membrane. The nuclei belonging to each fat cell are ovoid, compressed in the periphery, and under the high power there can be made out a reticulum of intranuclear structure

to suggest that fat or lipoid particles were also contained in the nucleus.

A few thin-walled capillaries accompany the fibrous strands already spoken of. Near the periphery of the growth the fibrous connective tissue is more dense, the nuclei more numerous, the fat cells holding smaller globules. There seems to be a capsule made of translucent fibrils around the whole. The surface of the piece removed for sectioning had no epithelial covering.

It has been supposed that these tumors spring from pre-existing fat cells in the adipose tissue, but I doubt if this suffices to explain all the facts. That some of the protoplasm in the cells of fibrous tumors is convertible into fat seems very probable.

Dr. R. L. Thompson reports:

The specimen consists of two small tumors 3x2 cm. in diameter, covered with mucous membrane. The tumors are soft in consistence and yellow in color and present to the naked eye the character of localized masses of fatty tissue. The contour of the tumors is regular and no lobulations are apparent. On section, the adipose tissue is penetrated by fine gray lines (trabeculae).

Microscopically the sections, stained with hematoxylin and eosin, show the mass to be made up wholly of adipose tissue, which is surrounded by a thin connective tissue capsule. Connective tissue septa radiate through and support the fat and carry blood vessels. A considerable number of lymphoid and plasma cells are seen in the connective tissue. At one point there is quite a distinct clump of lymphoid cells. At one edge of the section a little mucoid connective tissue is seen.

Diagnosis: Typical lipoma, with slight chronic inflammation.

REPORTS OF PREVIOUSLY REPORTED CASES OF
LIPOMA OF THE LARYNX.

Altogether there have been twelve cases reported previous to the author's case which may be strictly included in the nomenclature of lipomata of the larynx, or, to express it more accurately, neoplasms originating in, or having their attachment to the larynx.

CASE I.

HOLT:—**Pendulous Lipoma of the Larynx.**—*Trans. Pathological Society of London*; Vol. V, p. 123, 1854.

J. A., aet. 80, a robust man of active habit, was under the care of Messrs. Randolph and Rust, of Westminster, to whom Mr. Holt was indebted for the opportunity of exhibiting the specimen. About twelve years since, the patient's attention was directed to his throat, from an occasional, but then increasing, sensation of choking, of no material moment when he was calm, but becoming urgent upon excitement; this gradually became more frequent and he was aware of some swelling, or slight bulging, at the upper part of the throat. About four years prior to his decease, during the act of vomiting, a large mass became protruded, and to prevent immediate suffocation, he was compelled to return it as speedily as possible. He was at all times better enabled to swallow solids than fluids, for, as his powers of mastication were not good, he took the precaution of cutting his food into very small pieces. In swallowing fluids he occasionally experienced great difficulty and choking, but latterly, from taking everything very slowly, he was comparatively comfortable. His voice was husky, but occasionally distinct, more especially if perfectly calm; but when excited it became gurgling and inarticulate. He died suddenly while smoking his pipe, and it is conjectured (there being no person present), that the fumes of tobacco produced sudden cough and displacement of the growth, by which immediate suffocation ensued.

Upon a post-mortem examination, the viscera generally were found in a healthy state, and there was nothing to account for immediate dissolution beyond the presence of the tumor and its attachments.

Upon examining the pharynx, a large, pendulous, fatty tumor was detected, filling the pharynx and extending downwards towards the esophagus to the extent of nine inches. It was attached by an envelope of mucous membrane and fibrous tissue to the left side of the epiglottis, dragging it downwards and to the left side, so



Case of Holt. Pendulous lipoma of larynx—post-mortem specimen. (a.) Tumor. (b.) Epiglottis. (c.) Rima glottidis. (d.) Back view of a portion of the trachea. (e.) The pharynx laid open. (f.) Bristle passed beneath the tumor to show the limit of its attachment.

as to entirely prevent closure of the larynx; it was also connected with the upper part of the pharynx and esophagus. Several fatty tumors of small size were noticed in the neighborhood.

Mr. Holt remarked, the foregoing case was especially interesting: First, from its rarity and the large size of the tumor.

Secondly, from the imperfect closure of the glottis, as a consequence of the altered position of the epiglottis, thus affording frequent opportunities for the introduction of foreign substances.

Thirdly, that it should not have produced some permanent dyspnea, or alteration of the voice.

Microscopic examination by Mr. Ferguson and Mr. Partridge:

The pendulous masses consist of adipose tissue which, in the larger mass, is arranged in layers, separated by fibrous membrane. The examination of the larger tumor under the microscope shows the interior portions to consist chiefly of fat, with an external investing layer of varying thickness situated immediately underneath the mucous membrane and composed of fibrous tissue. In some parts of the larger swelling, where it had a yellow color, apparently underneath the investing mucous membrane, the fat tissue crossed out through the fibrous tissue to the surface. The tumors are only loosely connected to the submucous tissue. The fibro-cellular investment is thicker in the largest and most pendulous mass, than in the small ones.

CASE II.

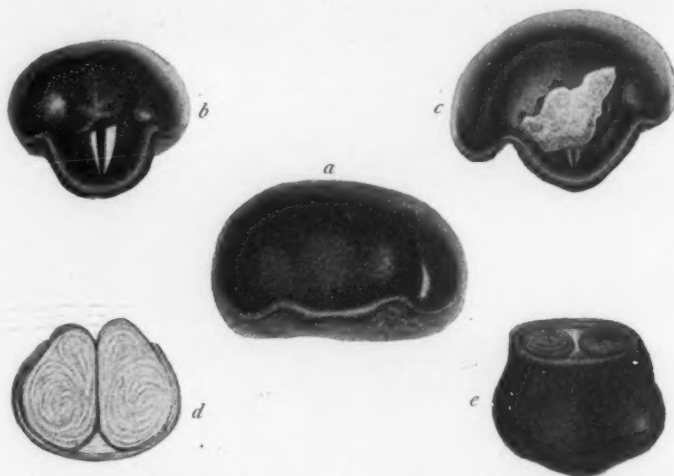
VICTOR VON BRUNS:—**Large Lipoma of Larynx, with Fibrous Base, Attached to Left Arytenoid Cartilage.**—*Monograph: 23 Neue Beobachtungen von Polypen des Kehlkopfes*, p. 154. Tuebingen, 1868.

Female, aged 25 years; from Mecklenburg, Germany. Large lipoma, with fibrous basis situated on left arytenoid process; extirpation with galvano-cautery, scissors and pincers. Numerous sittings.

Has had a rough, hoarse voice since earliest childhood. At age of seventeen, pain deep in throat, variable, at times worse than others. Hoarseness increased with pain. Shortness of breath only while dancing, cannot discourse at the same time. Frequently fluids and solid particles of food would enter larynx. Saw a number of physicians who treated local condition and general state; no improvement. Was seen by v. Bruns in 1867 for first time. He found a tumor extending from the epiglottis to posterior esophageal wall and from right lateral wall of pharynx to left wall,

Surface of tumor smooth and shining. Sagittal diameter of tumor (antero-posterior) was 14-16 mm. Frontal diameter of tumor (right to left) was 25-30 mm.

The tumor emanating from left half of posterior laryngeal wall was soft and elastic. Diagnosis: lipoma. Extirpation with hot wire loop. The removed tumor was found to have an outer capsule and enclosed two firm bodies which were united by very loose connective tissue. The capsule was formed from the stretched mucous membrane covering the left arytenoid process and vicinity.



Case of von Bruns. Large lipoma of larynx with fibrous base, attached to left arytenoid cartilage. (a.) View of neoplasm before operation. (b.) Part of growth removed at first galvano-cautery operation. (c.) Frontal section of same. (d.) Surface view of fibrous base of neoplasm and slough after second galvano-cautery. (e.) Final result of fifth galvano-cautery, showing cicatrices in fibrous stump of neoplasm.

Surface was smooth, shining and slippery. The tumor was dark-red and partly of a blue color; due, no doubt to the stasis of the blood produced by the constriction of the loop during operative removal. The covering or coat was composed of an external epithelial and vascular fibrous layer. The latter was composed of inelastic connective tissue, intermingled with an abundant quantity of delicate elastic fibres. The fibrous bundles were more richly supplied with nuclei peripherally than centrally; they ran parallel with the surface of the tumor. This mucus coat was very richly supplied with thin-walled blood vessels having a lumen of 0.05 to 0.1

mm. in diameter. It had no distinct membrane separating it from the epithelium. Presented no papillae; had smooth surface.

The epithelium was composed of numerous layers, about 15. The lower cells of the mucous membrane were short and cylindrical, with diffuse brown pigment. Nearer to the surface the cells assumed, first a polyhedral, then a flat shape, and were colorless. The distinctly separated pavement cells were covered by a thin cohesive layer of horny cells which could no longer be clearly differentiated.

The nucleus of the tumor thus enclosed was composed of two equally large, oblong, firm, fatty tumors, which formed flat facets at points where they came in contact with the surrounding tissues. It contained fat cells of medium size, filled with Margarin-crystal glands. Firm fibers of connective tissue coursed between the fat lobules and were observed macroscopically as whitish-yellow opaque curved lines.

The operation was followed by severe pains in mouth and throat; difficult phonation and deglutition, and slight fever. The condition improved in a few days and recovery was uninterrupted. The pain ceased entirely and the patient could breathe without difficulty. The voice was still somewhat harsh. No pain on deglutition. When seen again, five weeks later, almost no signs of a scar were left. Another tumor at the point where the plica pharyngo-epiglottica originates was found extending downwards and to the right as far as the incisura interarytenoidea. This tumor had a diameter of 25 mm. and entirely displaced the right arytenoid process. The tumor originated from the left side.

The tumor was accessible with difficulty, but was finally removed by hot wire loop. Only a portion of it was obtained. Examination showed it to be of the same consistency as the original tumor. In addition, the apex of this tumor contained a piece of white cartilage the size of a hemp seed (Hanfkorn), surrounded completely with connective tissue. The cells of the cartilage were small, inserted group-like in the pale yellow and partly hyaline cartilage, numerous elastic fibres forming the basic substance.

Condition after the operation was the same as at the previous operation. When the patient had recovered sufficiently the remaining portions of the growth were removed at many different sittings. The patient was dismissed after several months' treatment. The tissues were still a trifle larger at the affected point than normal, but it was decided to allow nature to effect further atrophy of the tissue involved.

CASE III.

E. WAGNER:—**Lipoma pes Kehlkopfes.**—*Archiv. der Heilkunde*, No. 2, p. 108, Leipzig, 1872.

This case is reported from the post-mortem records of the small-pox epidemic in Leipzig. A lipoma of the upper larynx was found in a girl thirteen years of age. This patient had been assigned for operation, but died of small-pox during the epidemic.

The growth was of the size of a hen's egg, and was attached by a thin, wide fold to the mid-line of the dorsum of the tongue and on the anterior part of the epiglottis; it was freely movable, much flattened posteriorly, otherwise irregular.

CASE IV.

SIDNEY JONES:—**A Fat Tumor of the Larynx.**—*Trans. Pathological Society of London*; Vol. XXXII, p. 243, 1880.

Pathological specimen from a man, aged 40. An irregularly-lobulated mass of fat, held together by delicate connective tissues. In one part (indicated by a bristle), is a cyst, now laid open; it is about three-quarters of an inch in diameter and probably communicated with the surface; it is lined with stratified squamous epithelium, some detached pieces of which closely resemble hydatid membrane. It was attached to the right aryteno-epiglottidean fold and hung down into the pharynx as a round, smooth tumor, of about two inches in diameter, covered with mucous membrane, with large veins. The patient could protrude this tumor into his mouth. An incision was made into the mucous membrane, and the mass forming the specimen, at once turned out.

The specimen is in the Museum of St. Thomas Hospital.

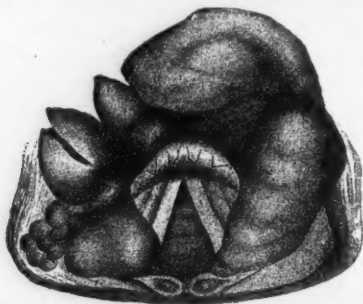
CASE V.

GOLBEK (OR HOLBECK), MARK KARLOVITCH:—**Lipoma Multiplex Arborescens Aditus Ad Laryngem.**—*Protik. Zasedamia. Imp. Kavkazsk. med. Obshtsh.*, Tiflis, Vol. XXVIII, pp. 422-427, 1 pl., 1891-92.

Male, Armenian, 61 years old. Ten or eleven years previously he had a little tumor at base of tongue, which was excised in 1883. It reappeared two or three years later and was re-excised several times without any effect. Of recent years the tumor had become so large as to interfere with respiration and deglutition. No syphilis.

On examination, the patient was found to speak indistinctly, he breathed with difficulty, and had difficulty in swallowing even

liquids. Slept in sitting position with head much inclined to one side. Impossible to examine mouth or larynx with laryngoscope, as patient suffered from dyspnoea if he changed the posture of his body, inclined forward, with head hung low. On ocular and digital examination of the oral cavity, one could see and feel anteriorly between the root of the tongue and epiglottis, two large tumors, rose-yellow in color, covered with a smooth shining mucosa. To the right, one tumor is of the size of a hen's egg, also hen-egg shaped; close to it on the left is a tumor the size of a walnut. Tumor has a broad base, no pedicle, and was attached in the glosso-epiglottic vallecula. Back of the right large tumor was another tumor; its direction was toward the larynx, the tail thereof occupying the laryngeal opening; this tumor is arch-shaped, in size and



Case of Golbek. *Lipoma multiplex arborescens aditus ad laryngem.*

form like the index finger of an adult, and appeared in the oral cavity when the patient coughed very strongly, or during movements of deglutition. On the left side, in the direction of the lig. glosso-epiglottici lateralis and plicae pharyngo-epiglotticae was a whole group of tumors, clearly disposed, varying in size from a large nut to a pea. This entire group aggregated in length and breadth the size of an index finger. The tumors are doughy and resemble lipomata.

The large tumor was at once removed by an ecraseur; found to be a lipoma. The other tumors were found to be on different levels, and closely adherent to the epiglottis, and had to be removed with a knife. After a preliminary tracheotomy, by local anesthesia, a tracheotomy tube was inserted by the Trendelenburg-Hahn method, the trachea being tamponed by a canulae imbedded in a compressed sponge, and covered above by a gauze sac. The pa-

tient was then chloroformed and operation begun. Two silk ligatures were put on, on the middle glosso-epiglottic ligament and apex of anterior tumor, and pulling the tumors, by the ligatures, forward, it became evident that the tumors could still not be cut out, hence the right cheek was cut open from the corner of the mouth to the anterior border of the masseter muscle. After this, and cutting the mucosa which covered the tumor with blunt scissors, the large anterior tumors were removed, then the left, then the tumors lying deeper in the direction of the lig. glosso-epiglottici lateralis and plicae pharyngo-epiglotticae. In the base of the excised tumors, three silk ligatures were placed. Very slight hemorrhage followed. The cheek was closed, the tampon-cannula was exchanged for an ordinary tracheotomy tube, and the usual antiseptic bandage ended the operation.

No temperature the first six days. The first four days food by high enemata. No suppuration. On fifth day patient began to eat in normal way, but inclining the head backward. On the seventh day temperature 38.8 degrees C. in the evening, two furuncles on the cheek and facial eczema. Temperature normal on the twelfth day; furuncles healed. Tracheotomy tube removed on the sixth day. On thirteenth day food no longer appeared in tracheotomy wound. On twentieth day the wound healed completely.

The tumors were found to consist of lipomatous, clearly disposed groups, of various sizes, covered with mucosa. The middle tumor was 6 by 5 cm.; the right lateral was 7 by 2 cm.; the left lateral consisting of numerous lipomata, was 7.5 by 5 cm.

The microscopic examination of these tumors was made by Seifert, of Wurzburg, and the description and diagnosis are included with the report on Koehler's case: Ueber Lipom des Kehlkopfes, *Sitzungsbericht d-phys-med. Gesellschaft zu Wurzburg*, pp. 32035.

CASE VI.

P. MCBRIDE:—**Clinical Notes on Fatty Tumors of the Larynx.** *Edinburgh Med. Journal*, Feb., 1889.

M. W. was brought to me by Dr. Carmichael on the 23d of July, 1887. The history of the case was as follows:

About six months ago the patient felt that occasionally in breathing he made a peculiar noise, but this occurred only for two or three minutes once or twice a day. Eventually this symptom became troublesome when the patient lay down, and finally he began

to experience difficulty in swallowing. There was no pain, but deglutition required a distinct effort, and was accompanied by a sound audible to those in the neighborhood.

On examining the throat, a pale-pink, rounded tumor was seen behind the tongue. Examination with the laryngoscope and probe showed that it was attached to the epiglottis, and about the size of a pigeon's egg. As my electric cautery was not ready for use at the time of the patient's first visit, the wire of Jarvis's snare with a bent shaft was passed over the tumor and tightened. To make a long story short, it was found that the wire could not be made to penetrate the growth, and the part seized had eventually to be cut off with bent scissors. This portion comprised about a half of the tumor. The remainder was easily removed by means of the galvano-caustic snare adjusted by the aid of the laryngoscope. The first portion of the growth removed was handed over to my friend, Dr. Alex. Bruce, who described it as a fibro-lipoma. The other half I now show you. The stump which was left had a broad attachment to the right vallecule and adjacent part of the dorsum lingue. At first the sloughing resulting from the electric cautery produced foetor of the breath and a bad taste in the mouth. These symptoms soon yielded to the use of a boracic acid gargle. On the 26th of December, 1887, the condition of parts was as follows: "Only a rounded fulness filling up right vallecule and evidently attached to the epiglottis and adjacent part of the tongue." On the 3d of December, 1888, Dr. Carmichael again brought the patient to me, and the tumor had not only recurred, but reached a size equal to that when it was first examined. To this recurrence I attach little importance from the point of view of ultimate prognosis. At the same time, it is evident that a tendency to reappearance will exist so long as any part of the tumor is left, and it will be no easy task, situated as it is, to extirpate the growth together with its capsule by endo-laryngeal operation.

CASE VII.

P. MCBRIDE:—**Clinical Notes on Fatty Tumors of the Larynx.** *Edinburgh Med. Journal*, Feb. 1889.

P. B., aet. 71, porter, applied for treatment at the Royal Infirmary on the 16th of November, 1888, giving the following history:

Some five or six years ago the patient felt a lump in his throat, and though aware of its presence, did not find it to obstruct the breathing, cause pain, or interfere with swallowing. It gradually enlarged, causing, last September, a thickness of speech and ob-

structing the breathing when the patient lay on his left side. Later difficulty in swallowing has been experienced, but there has been no pain at any time. Sleep has never been disturbed.

On laryngoscopic examination, a pale pink mass was seen overlying the left arytenoid cartilage. On touching this with a probe a cough resulted, which shot the tumor up to a level with the dorsum of the tongue. The growth was eventually seized with a vulsellum; the snare of the electric cautery was then passed over it and pressed well down, tightened, and the tumor removed. The latter was fully as large as a bantam's egg. A fragment removed was examined by Dr. Martin, and found to consist of fatty tissue. I now show you the lipoma in question, and it will be at once noticed that it has also a distinct capsule. After removal it was seen that the pedicle was narrow, and had been attached to the outer part of the right pyriform sinus. The patient was kindly given a bed for a day or two by Professor Annandale, because I feared that laryngitis might possibly result from the effects of the electric cautery. No such untoward result, however, supervened, and a week after the operation only a white eschar was visible on the outer and anterior part of the sinus pyriformis. From the very few cases so far published it is impossible to generalize as to the diagnosis and prognosis of fatty tumors of the larynx. We may, however, say that they are characterized—(1), by their light pink color; (2), the disproportion between their size and the symptoms they produce; and from my first case we are also entitled to conclude that unless the removal be complete, rapid recurrence may take place.

Since writing the above, I have again operated on my first case, in which, as will be remembered, recurrence took place. The tumor was seized with a strong and heavy pair of catch forceps. Over these the galvano-caustic snare was slipped, and the growth which I now show you removed. As will be observed, it has the appearance of having been enucleated rather than cut off. On examining with the laryngoscope after the operation, from which virtually no bleeding resulted, there was seen to be an excavation corresponding to the point of attachment. It was further noted that the right margin of the epiglottis was somewhat excavated, a condition probably due to the pressure of the somewhat pendulous tumor, which, although attached by a broad base, tended to hang over into the laryngeal cavity.

This last operation seems to indicate the advisability of seizing not only the capsule of the fatty tumor, but also the adipose tissue,

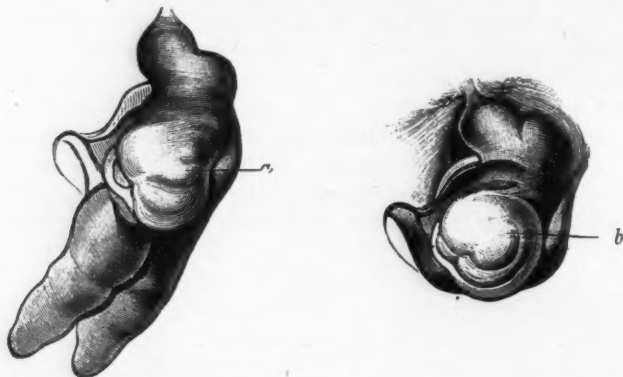
so that the latter may be drawn from its bed and enucleated as completely as possible. I may mention that when the patient was last examined, cicatrization was completed, but that no reaction of any note had followed the removal of the growth.

CASE VIII.

L. VON SCHROETTER:—**Lipoma des Kehlkopfes.**—*Vorlesungen über die Krankheiten des Kehlkopfes*, p. 271, 1893.

I have had occasion to observe an unusual and well defined case of lipoma of the larynx.

The case was attached to the ligamentum glosso-epiglott. med., the lateral edge of the epiglottis, the ligamentum pharyngo-epig-



Case of von Schroetter. Lipoma arborescens. (a.) Showing round, yellow eschar, following galvano-cautery. (b.) Digital prolongations of neoplasm.

lott., and the entire length of the aryepiglottic fold of the left side. The growth extended partly into the larynx; partly into the sinus pyriformis; and partly into the space between the posterior larynx and pharynx wall. The growth was freely movable, reddish in color, and extremely soft.

The mass was removed by means of the galvano-cautery. The tumor thus removed weighed ten (10) grams, and the several digital-like prolongations measured as much as thirty-seven (37) mm. in length, and twelve (12) mm. in width.

The detailed examination of the neoplasm was made by Dr. Paultauf; the diagnosis was that of lipoma arborescens, originating from the submucous tissue. An especially emphasized point of

this examination was that the tissue from which this origin was traced, is normally very deficient in fat.

This neoplasm consisted of small lobules and well organized fat tissue, liberally interspersed with connective tissue fibers, and fair-sized blood vessels. The overlying mucous membrane is closely intermeshed with numerous dilated and hyperaemic blood vessels, around which and diffused throughout, there appear numerous lymph cells; a fact which should not be considered unusual in this well-marked field of polyp. formation, where there is abundant opportunity for such tissue changes. The laminated pavement-epithelium occurs profusely in spots.

The accompanying drawings were made only after a part of the neoplasm had been removed by galvano-cautery; both drawings show the round, yellowish surface produced by the galvano-caustic eschar. Figure B shows the digital prolongation of the neoplasm, which extended into the pharynx and larynx.

CASE IX.

KOEHLER:—**Lipoma of the Larynx** (*Ueber Lipom des Kehlkopfes*). Reported by Seifert (Wurzburg).—*Sitzungsb. d. phys. med. Gesellsch. zu Wurzburg*, pp. 32035. 1894.

Male, aged 45 years; had observed a change of voice many years before operation. Sought medical aid when impairment of breathing occurred. Examination revealed a pigeon-egg sized tumor, pale-red in color, occluding the posterior two-thirds of the lumen of the larynx. It arose from the anterior surface of the posterior laryngeal wall. Removed with galvanic loop.

The microscopic examination of the tumors in the case of Golbek and in the case of Koehler, are incorporated by Seifert in the same report:

The microscopic examination of both tumors was alike. The well-preserved epithelial coat composed of pavement epithelium which, at certain points, dipped deeply into the tissues; at some points there was an appearance of papillae-like condition. Connective tissue preponderated near surface of the tumor. Immediately beneath the epithelium were scattered fat cells, farther towards the center were numerous fat lobules composed partly of large fat cells separated by narrow or broad connective tissue strands running parallel with the surface of the tumor. In the vicinity of the fat lobules and in the connective tissue lamina a marked cellular infiltration was noticed.

The blood vessels were dilated in part; they showed considerable thickening of their walls; more marked in the arteries than in the veins. Marked cellular infiltration observed also near the vessels.

CASE X.

JOHN W. FARLOW:—**A Case of Polypoid Lipoma of the Larynx.**
New York Medical Journal, November 16, 1895, p. 610. Vol. 62.

In March, 1893, J. W., aged 63 years, consulted my colleague, Dr. W. F. Knowles, for a polypus of the throat. His health had always been good. He first noticed trouble in his throat about fifteen years before, and his family physician had removed a piece of about two inches long, two years before, with straight scissors. On bending his head forward and downward and coughing, a polypoid growth appeared, the tip of which could be drawn at least half an inch beyond the lips. When I saw him he was holding the tumor, wrapped in a fold of his handkerchief, with the fingers of his right hand outside the right side of his mouth. The growth had several projections from it and reminded one of branching coral. It almost entirely occluded the orifice of the larynx and seemed to have attachment to the posterior laryngeal wall just above the right arytenoid. When he let go of the tumor it fell back into the pharynx and one piece dropped down between the vocal cords into the subglottic and tracheal region. This piece was somewhat attenuated and constricted, probably by the action of the vocal cords.

For several months he had been much troubled by shortness of breath, which is very natural, considering how the larynx was filled up.

At the patient's first visit, Dr. Knowles attempted the removal of the growth with a cold wire snare, but an accident to the snare forced him to use long, curved scissors to free the wire and he removed two large pieces. The patient's breathing was so much improved that he refused any further treatment until December, 1894, when he again appeared on account of a decided increase in the size of the growth. With a galvano-cautery, Dr. Knowles removed the rest of the growth in three pieces. The attachment was found to be very low down in the pharynx. Three months later there had been no recurrence. Microscopic examination showed it to be a submucous polypoid lipoma. Dr. Farlow showed the specimens in alcohol and also the photograph, natural size, taken from the fresh specimens.

CASE XI.

FRANK W. HINKEL:—**Report of a Case of Fibro-Lipoma of the Larynx.** *Transactions of the 20th Annual Meeting of the American Laryngological Association, Brooklyn, N. Y., May 16, 1898, p. 75.*

Mrs. F., aged 55 years, consulted me March 22d, 1895. She gave a history of excellent general health. During the winter of 1883 she became conscious of a tumor of some kind at the back of the tongue. She consulted Dr. Roswell Park, of Buffalo, who removed a long, slender, cylindrical tumor which, as preserved in alcohol by the patient, was about an inch and three-quarters in length by a third of an inch in diameter. She reported that it had been removed with scissors, and had been cut with ease, and without pain. After some years there was a gradual return of symptoms, and ten years later, in February, 1893, Dr. Park removed in the same manner a somewhat spherical mass about a third of an inch in diameter. In August, 1894, Dr. Park again removed a tumor of shape and appearance similar to that removed in 1893. The symptoms returned speedily. There was not, when she consulted me in 1895, nor has there been since, any pain, cough, or expectoration. There was no difficulty in swallowing. Speech was normal, but there was impairment of the singing voice. At no time then, nor since, have there been other symptoms than a sensation of some foreign body in the throat.

Her father had died of "cancer of the face, beginning as a mole under the left eye."

She presented an appearance of good health. There was nothing abnormal about the nose or upper pharynx. From the upper left-hand margin of the epiglottis a pinkish-white tumor of flabby appearance depended into the left pyriform sinus, resting upon and concealing the ary-epiglottic fold and arytaenoid. It was soft and doughy under the probe. There was some varicosity of the root of the tongue. The tumor was readily engaged in the loop of a light snare. To my surprise, despite the soft appearance and feeling of the tumor, I was unable to draw the loop home. Using the snare to drag the tumor within reach, I removed it in three pieces, with curved scissors. It cut dense and hard without much pain or bleeding. There remained after healing some fullness of the left half of the glosso-epiglottic fossa, involving slightly the left perpendicular edge of the epiglottis and extending on to the anterior wall of the pyriform sinus. The color of the parts was quite normal.

On March 9, 1898, Mrs. F. again consulted me, reporting that during the past winter she had had some slight discomfort about her throat. Examination revealed a pinkish-white, smooth, elongated tumor broadly attached to the free margin of the epiglottis and depending to the right, producing an appearance as though the right side of the epiglottis were turbaned or folded upon itself vertically. The left ary-epiglottic fold was much thickened, concealing the left arytaenoid and a part of the left vocal band, encroaching upon the lumen of the vestibule of the larynx, and partly filling the left pyriform sinus. Color and motility of the vocal bands were normal, and there was no involvement of the ventricular bands. The patient was able to bring a small portion of the epiglottic tumor into view on a part of the tongue, where it presented an appearance much like a polyp. With forceps and scissors it was readily removed. It presented two digitations, and was about three-quarters of an inch in length. With a heavy snare and curved cannula I twice engaged the flabby and dependent laryngeal face of the left ary-epiglottic fold. The wire broke each time, showing great density of structure. Epiglottis after the operation presented a curious appearance. The entire glosso-epiglottic fossa was felt almost to the level of the tip of the epiglottis with tissue, presumably similar to the tumor removed. The consequent optical effect was as though the epiglottis had been amputated near the point of its attachment, when, in fact, it was of normal size and appearance on its laryngeal face.

As Mrs. F. suffers from no unpleasant symptoms at present, no further attempt was made to remove the redundancy of the left ary-epiglottic fold.

The persistent recurrence of this tumor, and its peculiar and unfamiliar appearance, led me to send the specimens presented herewith to Dr. Jonathan Wright for examination. With his usual kindness and keen interest in all cases pertaining to pathology, Dr. Wright has given these specimens careful study and has prepared the exhibits that are the chief value of this report.

From a microscopic appearance he at once suspected the tumor to be lipoma of the larynx. Later microscopic examination confirmed this opinion.

The following is his report:

"No. 644. Various specimens received at different times from Dr. Hinkel, from the larynx of the same case, show a tendency to take the form of long, finger-like projections. The one removed

in 1883, after remaining fifteen years in alcohol, is 45 millimeters long and about 8 millimeters wide at the broadest point. Other growths are more or less of the same shape, some being tuberous, while some are more sessile. Their shape seems to differ somewhat according to their structure. The following are their microscopic and general characteristics, according to the dates of their removal.

"1883. Is made up particularly of fat cells, especially at its distal part, having more fibrous tissue at its base."

"1893 and 1894. These growths, being more sessile, are largely made up of curling, elastic, fibrous tissue, but here and there some fat cells may be seen."

"1895. A long, tuberous-shaped growth shows a large predominance of fat tissue."

"1898. A more sessile growth is almost exclusively made up of the curling elastic fibers. There are one or two circumscribed areas of round-celled infiltration."

"The surface of all these growths is covered by stratified, flat epithelial cells."

This case is interesting, not only on account of its rarity, but also on account of the persistent recurrence of the growth and the gradual infiltration of the attaching tissues.

In addition there is an interesting transformation in the character of the growths that have recurred after the removal of the lipomatous tumors. This is well shown by drawings from sections made by Dr. Wright.

Figure 1 represents a section of the first tumor removed by him in 1895. This tumor was found by Dr. Wright to be entirely analogous in structure to the original growth removed by Dr. Park in 1883. They both present well-marked lipomatous structure.

Figure 2 is from the recurrent tumor removed this year, and shows it to be largely fibrous in structure.

CASE XII.

APLAVIU: (Kassan)—**A Case of Lipoma Durum in the Pharyngo-Laryngeal Cavity, Removed by Sub-Hyoid Pharyngotomy.**
Arch f. Klin. Chir., Vol. XLI, 1891.

Apaviu reports the case of a man 28 years of age in whom sub-hyoid pharyngotomy was performed for the removal of the neoplasm in the pharyngo-laryngeal cavity. On digital examination it was

determined that the growth was attached to the posterior wall of the cricoid cartilage, that it was freely movable and that the patient could at will protrude the mass upwards into the oro-pharynx, or into the mouth of the esophagus. The growth measured 10 cm. in length and 4.3 cm. in width.

Diagnosis from microscopic examination showed lipoma durum, with fairly well-developed blood vessels in the central and in the apical part of the growth.

The growth was removed by sub-hyoid pharyngotomy. The author suggests, in addition to the cross-incision of Malgaigne, the resection of the cornu of the hyoid bone by means of strong, pointed scissors. This effects an unusual mobility of the larynx, and the aditus laryngis can thereby be drawn into the same plane with the wound of incision. The preliminary performed tracheotomy does not affect the mobility produced by this technique.

In conclusion, I wish to express my thanks and appreciation to Dr. Jonathan Wright for his interest in the microscopic examination in this case; for his valuable opinion in the microscopic diagnosis, and for the excellent photographs of the slides, made under his supervision; to Dr. R. L. Thompson, for his prompt report of the pathologic diagnosis; and to Dr. I. D. Kelley, Jr., for his pen drawings of the tumor as seen by direct inspection.

3858 Westminster Place.

Gastric Symptoms of Arteriosclerosis. H. L. AKIN. *Journal A. M. A.*, June 5, 1909.

The writer discusses the frequency of this condition and gives the histories of some personal cases. He reviews the mechanism of the production of the symptoms as explained by Pal, Ortnier and others, and states that in making a diagnosis it is of the utmost importance not to be led astray by the patient's complaints of indigestion, pain in the stomach, distention, and belching, and so neglect to make a careful physical examination. He emphasizes particularly the importance of examining the vascular system thoroughly. In treatment he advises a restricted diet, and states that in this, as in all other arteriosclerotic conditions, the iodids are the most valuable drugs.

THE ACTION OF THE RESPIRATORY MUSCLES IN THE PRODUCTION OF VOICE.*

DR. G. HUDSON MAKUEN, PHILADELPHIA.

At the last meeting of this association there was a hurried and somewhat unsatisfactory discussion of the action of the respiratory muscles in the production of voice, and as I was in part, at least, responsible for its precipitation, I welcome this opportunity of reopening the discussion in order that I may more fully set forth my views in the matter. The opening paper upon the subject, as you will recall, was entitled the essentials of voice production, and although it was presented by a physiologist and teacher of high repute, and contained many excellent things, it contained no reference whatsoever to what many consider to be one of the great essentials of voice production, namely, the action of the respiratory muscles.

I called attention, at the time, to the fact that, in his recent book on voice production, the author also dismisses the subject of breath control in a few words, presumably leaving this important phase of the subject to chance, or as Sam Weller would say, to the "taste and fancy" of the speaker. The same criticism may be made of nearly all the books on this subject, and if we were to look for a cause of the omission, I think we should find it in the fact that the exact use of the respiratory muscles in the production of voice is exceedingly hard to demonstrate and even to understand. It ought not to be difficult, however, for one who does understand it, to explain or demonstrate it to a body of men such as those to whom this paper is addressed.

I think I understand the action of these muscles in the production of voice, but I am not at all surprised when others seem to doubt it. A medical friend of mine in Philadelphia, who has made a special study of the adominal and thoracic viscera, says that very little is actually known about the diaphragm in the living subject, and its action even in ordinary passive breathing, and when it comes to the more complicated action of this and related muscles in the production of voice, we have a still more difficult problem to solve. When I told him that my diaphragm is in strong contraction during the emission of a sustained tone, he asked how I knew that it

*Paper read before the American Laryngological Association in Boston, Mass., June 1, 1909.

was thus in action. I said, "I can feel it contract," and that is how I know.

The kinesthetic sensations of muscle action are largely acquired, and they may be developed to a high degree. It is quite possible for one to learn to feel the sensations of muscle action and to call them into consciousness. Indeed, this forms a part of the education of every vocalist.

The kinesthetic faculty must be acquired especially by those who would overcome a faulty muscle action, whether it be in the production of voice or in the articulation of voice into speech, and it is for this reason that I make such a point of the precise action of these muscles in the production of voice.

The same principle is made use of in the teaching of the blind and deaf. Helen Keller, for instance, depends entirely upon the development of the kinesthetic areas of her brain for guidance in her vocalization and articulation. Indeed she has no other senses to guide her. She cannot see the action of her muscles, nor can she hear the results of their action, but she probably feels and knows the sensations for every word and syllable which she utters.

In the teaching of the deaf, as you know, much attention is given to the exact use of the muscles of the lower jaw, the lips, the tongue and the palate, and in a similar manner we may teach the precise use of the abdominal muscles, the diaphragm and the large thoracic muscles in the production of voice. We cannot see their action, but we can learn to hear and appreciate the results of their action, and to feel the sensations which arise from their use. The trained ear may even learn to tell which muscle or group of muscles is at fault from the particular character of voice that is being used, and this knowledge is very helpful in the treatment of defects of voice and speech.

There are two schools which seem to be diametrically opposed in their thought as to the action of the diaphragm and abdominal muscles in the production of voice. The one school, and this is the one in which I was first educated, advocates a sinking or drawing in of the abdominal walls, and the other one, to which I now belong, advocates the protrusion of the abdominal walls during the emission of tones. The difference consists entirely in their notion as to the action of the diaphragm. Is it contracted, or is it relaxed during the act of voice production? If it is relaxed, then the contraction of the abdominal muscles will tend to push the abdominal viscera and diaphragm, piston like, up into the base of the thoracic

cavity, and there will be a sinking of the abdominal walls, but if, on the other hand, it is contracted, there will be a compression of the abdominal viscera and a slight protrusion of the abdominal walls, the extent of which will be governed by the amount of resistance the extent of which will be governed by the amount of resistance given by the contraction of the abdominal muscles.

Those of the first school probably constructed their theory upon the commonly accepted views of physiologists with regard to the action of the diaphragm in ordinary respiration. The books tell us that the diaphragm is an inspiratory muscle, that it contracts during inspiration, thus elongating the thoracic cavity, and relaxes during expiration, when the thoracic cavity becomes shortened.

In the process of ordinary respiration, therefore, the act of inspiration may be considered as being active, while that of expiration is passive. In other words, inspiration is the result of the enlargement of the thoracic cavity by muscular contraction, and expiration is a result merely of a passive return of these muscles to their original condition of partial relaxation.

It is not difficult to understand, however, that this theory will not apply to the production of voice, which is a positive and not a negative process. In other words, after drawing air into the lungs by a muscular contraction we do not then let it flow out for vocal purposes by muscular relaxation, but we control its outward movement in voice production by definite and powerful muscular contraction.

The action of the muscles in normal breathing, therefore, is not the same as the action of the muscles for vocalization, because the expiratory phase of the one is passive, while that of the other is active. My attention was first called to the importance of breathing in relation to voice production when I was a student of the subject some years ago.

Among the authors which I consulted was the late Dr. John Howard, whose book, now unfortunately out of print, is the very best of which I have any knowledge, and to him more than any one else am I indebted for my interest in the subject. I claim no originality for the method, but I do claim to have given it a thorough trial, during nearly thirty years of practice and teaching of the voice and speech, with upwards of five thousand pupil-patients.

The faulty method, to which I have referred, is the outgrowth of the notion that the breathing of voice production is alike in all respects to normal passive breathing, a proposition which is altogether untenable.

The exhalation of the one form of breathing is passive, while the exhalation of artistic breathing is active, positive, definite and precise. The inhalation of artistic breathing is powerful and rapid, while the exhalation may be equally powerful, occasionally rapid, but sometimes very much prolonged. In this rapid and strong inhalation, the diaphragm must take no part whatsoever, but in the artistic exhalation which follows, it must take a more or less controlling part. In other words, for artistic purposes the diaphragm is not an inspiratory but an expiratory muscle, and not only so, but the slightest action of the diaphragm interferes with forced inhalation by checking the full expansion of the thorax. This can be readily demonstrated by the following simple experiment. Place the hand upon the upper third of the abdomen and, while taking a forced inhalation, push the abdominal wall forward, which, be it understood, can be done only by the contraction of the diaphragm. When the greatest possible amount of air has been inhaled by the combined action of the rib-raising muscles and the diaphragm, allow the abdomen to recede, which can be done only by the relaxation of the diaphragm, and note that an appreciable amount of additional air may be taken in, because the relaxation of the diaphragm permits of a further upward and outward movement of the ribs. This little experiment, suggested by John Howard, and which anyone may make for himself, proves conclusively, I think, that any action of the diaphragm interferes with the full inhalation often requisite for artistic purposes.

Now, when the inhalation is completed, the production of voice immediately follows, the very first part of the tone being the result of the natural recoil of the air cells of the expanded lungs and of the inspiratory muscles, which have caused the expansion. As the tones proceed, the inspiratory muscles relax and the expiratory muscles contract with a force which is proportionate to the strength and volume of the tone, and that the diaphragm is an important factor in this expiratory effort is shown by the concomitant protrusion of the anterior abdominal walls.

As an inspiratory muscle, therefore, the diaphragm is not a success, at least for artistic purposes. Powers and others have shown that only about twenty-five cubic inches of air can be inhaled by any purely diaphragmatic effort. In forced inspiration the lateral walls of the thorax must expand to the full extent, because the lateral walls cover about five-sixths of the entire lung service, while only the remaining one-sixth is contiguous to the diaphragm.

Furthermore, it has been demonstrated that a pair of lungs removed from the thorax and inflated, expand through the lateral and antero posterior diameters far more than through their vertical diameters. Anything therefore that interferes with the enlargement of these diameters, interferes with artistic breathing. That the contraction of the diaphragm does interfere with the upward and outward movement of the ribs, is shown by the fact that a contraction of the diaphragm resulting from electric stimulation of the phrenic nerve actually pulls the ribs in.

Let us consider briefly, first, the mechanism of the inhalation for voice production, and, second, of the exhalation for voice production.

In the time at my disposal, it will be quite impossible to discuss the action of all the muscles employed in the production of voice, nor indeed is it necessary to do this, because many of them work in groups and may thus be disposed of.

A word as to the framework of the thorax seems to be necessary at this point. As you well know, the ribs, while at rest, incline downward from their attachment to the spinal column, and in addition, their natural curved shape tends to increase this downward inclination, and you can see at a glance that the enlargement of the thorax can best be brought about by the outward rotation of the ribs and their elevation relative to the spinal column. As John Howard has pointed out, it is quite possible to elevate both the ribs and spinal column together and thus get very little increased thoracic expansion. To get the best results, the ribs must be brought approximately to a position which shall be at right angles to the spinal column.

The inspiratory muscles may be divided into two classes, the fixation muscles and the actual rib-raising muscles. The fixed points to which the latter group is attached are three in number, namely the spinal column, the head and the shoulder, on either side, composed of the clavicle, scapula and humerus. The spine is more or less fixed by the erector spinae, the head by the trapezius and complexus, and the shoulder bones (the clavicle, scapula and humerus) by the trapezius, the rhomboid, the levator anguli scapulae, the scaleni and the deltoid muscles. From these three more or less fixed points the rib-raising muscles descend to the ribs, their lower and movable points of attachment.

The chief of the rib-raising muscles are the serratus magnus, the latissimus dorsi, the pectoralis minor, and to some extent also the

pectoralis major. All the afore-mentioned must be regarded as inspiratory muscles, because they either pull directly upon the ribs or hold in a fixed position the upper attachments of the rib-raising muscles.

This brings us to the muscles of exhalation for voice production, or the expiratory muscles. The erector spinae has been referred to as a fixation muscle for the spine in inspiration, and it has a similar function in expiration. It must hold the spine erect against the forward and downward-pulling of the diaphragm and abdominal muscles. The abdominal muscles are attached to the movable ribs above, to the more or less fixed spinal column in the rear and the upper edge of the pelvic bone below. These muscles form the anterior and lateral walls of the abdominal cavity, and they extend posteriorly to either side of the spinal column.

Obviously, the first result of the contraction of this net-work of muscles is to compress the abdominal viscera and to push them upward against the only other yielding portion of the abdominal walls, namely, the diaphragm. But this can have but little expiratory effect, because it merely pushes the diaphragm up into the thoracic cavity and does not, to any extent at least, pull the ribs downward and inward, which must be their direction in forcible expiration. If, however, the diaphragm is contracted and thus made to resist the upward motion of the abdominal viscera, it helps to form a sort of fulcrum, over which the abdominal muscles pull downward and inward. On the other hand, when the ribs are pulled upward and outward by the inspiratory muscles, the contraction of the diaphragm pulling over the abdominal viscera, already compressed by the simultaneous contraction of the abdominal muscles, will tend also to pull the ribs downward and inward with considerable force.

The points of fixation for the abdominal muscles are the crests of the ilium and the spine, and when the diaphragm contracts preventing the inward and upward movement of the abdominal viscera, the recti muscles with their tendinous aponeuroses form a more or less fixed surface from which the other abdominal muscles, the external, internal and transverse, pull downward upon the ribs with great force. Likewise when the ribs are drawn up nearly at right angles to the spine, as they are in the full inhalation required for voice production, the diaphragm tends to become flattened out like a large plate, and during the emission of tone its contraction over the resisting viscera, slightly compressed by the action of the abdominal muscles, will naturally result in a pulling of the ribs inward with

considerable expiratory effect, the slight upward pulling of the ribs by the diaphragm being more than offset by the action of the abdominal muscles, the quadratus lumborum and the seratus posticus inferior.

The intercostals are usually given a prominent place among the respiratory muscles, but I fail to see how they can be more than subsidiary to those which I have already described. The distribution of the fibers of the external intercostals are such that their contraction, unassisted by any fixation muscles, would merely pull the lower rib upward a little further than it would pull the upper rib downward, and the fibers of the internal intercostals being attached further from the spine above would pull the upper rib downward a little further than they would pull the lower rib upward. It is evident therefore that the intercostals of themselves can have but little respiratory action, but when the upper rib and clavicle are fixed, mainly by the scaleni muscles, their combined action is inspiratory, and when the lower ribs are fixed by the abdominal muscles, the quadratus lumborum and the seratus posticus inferior, their action is expiratory.

An effort has been made herein to describe briefly the action of the respiratory muscles in the production of voice, as this action is understood by the best exponents of both the theory and the practice of the subject. There will be, I think, no special controversy between the general and special physiologists except as to the action of the diaphragm. This muscle has been classed with the inspiratory muscles for so long a time, that there will always be those who will oppose its removal from this class for any purpose whatsoever until absolute proof can be given of the necessity of doing so. With our present facilities and instruments of precision this proof, it must be admitted, cannot now be given, nor does it seem to be forthcoming although Rentgenography may yet come to our aid in this connection. Indeed I made an attempt to have some pictures to show you at this time, but the efforts of Dr. C. L. Leonard of Philadelphia, who has made some excellent Rentgenograms of the abdominal and thoracic viscera in which the position of the diaphragm is shown very clearly, were not altogether successful. We tried to get on the same plate a picture of the two positions of the diaphragm, the one in forced inspiration and the other in forced expiration, in order that we might make satisfactory comparisons, but we were obliged to abandon the scheme temporarily because of some slight difficulties in the way of technique.

The picture which we attempted to make, however, even if we had been successful, would merely have shown the positions of my own diaphragm in forced inhalation and exhalation. It would merely have shown the action of the muscles which I had acquired for artistic purposes, and this of itself would not have proved anything. To be of any scientific value, pictures of a large number of the best vocalists would have to be taken and a series of moving pictures would probably have to be made while the vocalists were in the very act of singing and speaking. That this may be done in the near future is well within the realm of possibility, and we shall probably have to wait until then for absolute proofs of the propositions advanced in this paper.

SUMMARY.

The most important thing in voice production is good and efficient breathing.

Good breath control is absolutely essential to good voice production.

There may be various methods of controlling the breath in voice production, but there is only one best method.

Breathing may be divided into two classes, passive and active breathing. Passive breathing is that which is used for all ordinary purposes, such as merely aerating the lungs, and active breathing is used for extraordinary purposes, such as singing and speaking.

In passive breathing the aeration of the blood is the chief purpose, whereas in active breathing it is of secondary consideration. The inhalation of passive breathing is due to a slight contraction of certain muscles including the diaphragm, while the exhalation is purely passive and due to a recoil of these muscles and of the air cells to their original condition. The inhalation of active breathing is much more extensive, and consists in the wide expansion of the thoracic cavity by means of a more or less vigorous contraction of the rib-raising muscles.

In active inhalation the diaphragm takes no part whatsoever, because its contraction interferes with the upward and outward movement of the ribs. The exhalation of voice production consists in the relaxation of the rib-raising muscles, and a more or less vigorous contraction of the rib-depressing muscles, the chief of which are the diaphragm and the abdominal muscles.

During the inhalation of voice production, the diaphragm and abdominal muscles should be entirely relaxed, so that at the point of

fullest inhalation, the recti muscles extending from the symphysis pubis to the ensiform cartilage should form or approximate a straight line.

Any protrusion of the anterior abdominal walls during inhalation interferes with the expansion of the ribs, and therefore with the fullest breathing. In the exhalation of voice production the diaphragm and abdominal muscles contract simultaneously and to a degree commensurate with the amount of breath pressure required.

For strong and impassioned tones, the breath pressure is sometimes very great. The action of the respiratory muscles in the production of voice is very important, and it must be acquired by long practice properly directed. Defects of voice and speech are due in large measure to faulty breathing, and successful voice culture or voice building depends almost altogether upon the accuracy and efficiency of breath control.

CONCLUSION.

1. The action of the respiratory muscles in voice production differs in some important respects from their action in passive breathing.
2. While the function of the diaphragm is inspiratory in passive breathing, it must be expiratory in active or artistic breathing.
3. Although the diaphragm is generally classed among the involuntary muscles, its action, like that of so many other so called involuntary muscles, may be brought entirely within the domain of the will.
4. The proper use of the respiratory muscles for singing and speaking may be acquired by practice, and should be taught by the teachers of voice culture.

1627 Walnut St.

A Contribution to the Study of the Endocranial Complications of Middle-ear Suppuration. HUTTIG. *Archiv f. Ohrenheilkunde*, July, 1906.

A report and critical study of four cases as indicated in the title.

YANKAUER.

THE SUCTION OR HYPEREMIA TREATMENT OF ACUTE SUPPURATIVE OTITIS MEDIA.

BY EDWARD J. BROWN, M. D., MINNEAPOLIS, MINN.

In beginning the treatment of a double otitis media suppurative, March 8, 1902, in a forty-five years old letter carrier, severely ill with grippe, it occurred to me to exhaust the contents of the middle ears following a free posterior paracentesis of each, to avoid the possible danger of inflation. So much blood was drawn that in spite of a good recovery in that case I did not venture to repeat the treatment till my courage had been revived by the paper of Dr. Percy Fridenburg, of New York, published some time later. Since that time I have treated all my acute cases by the method suggested, using in the earlier cases the exhaust power of a Politzer bag, and as my courage became greater, that of the large ear syringe within the limit of not causing excessive pain. At the first treatment after a free paracentesis, the removal of from one-half to one or more drams of blood, or blood and pus has in some cases given immediate relief to the pain and, in a measure, to the mastoid tenderness. In the later stages of many cases after the nasal and throat conditions had become more quiet, it has been my habit to have the patient perform the Valsalvan inflation, (the nose and throat having first been washed) to relieve the tension of the exhaust. In a later paper, Fridenburg states that he has had continued good results from this exhaust treatment and says that by its use he has been able in many cases to avoid the later repeated opening of the drum membrane. My own experience is similar, in that most cases do not require repeated opening. Two cases of heavy drinkers, seem to have done better under this treatment than would have been the case under ordinary methods. D. H., thirty-nine years old, liquor dealer, seen in consultation, November 10, 1907, having had O. M. S. A. right, fifty-one days. For ten days there had been no discharge till the past twenty-four hours, but there had been pain for some days, severe for the past twenty-four hours, also mastoid tenderness, especially at the tip, but less severe since the slight discharge. Pulse 90, temp. normal. There had been no treatment except that the family physician had made a small paracentesis three weeks after the trouble began, and the ear had been cleansed, as the slight discharge appeared. A free

posterior incision was made, a small amount of blood and pus removed by the exhaust, 10 percent carbol-glycerine and dry heat advised, together with care to keep the incision open till discharge had ceased.

On January 6th, in the absence of his physician, H. returned to me. There had been no discharge, but continued "pounding" in the ear the past three weeks. Deafness of the right ear was complained of. No pain, no mastoid tenderness, membrana tympani covered with desquamating epithelium, but no marked bulging. Temp. 99.3. As operation was objected to, carbol-glycerine and dry heat were ordered with two grains of calomel. January 7. Pain till 3 a. m., temp. normal, mastoid tender over the antrum and bulging of the mem. flac.

The membrane was freely incised, the exhaust applied and carbol-glycerine and hot douching ordered. January 8th, abundant thick yellow pus, containing pneumococci, slight boggy swelling over mastoid, and swelling of the posterior superior canal wall to hide the mem. tym., pulse 96, temp. 99.2. Mastoid section suggested but not urged owing to alcoholic condition and objection of family physician. During the following weeks the temperature was normal or subnormal, the pulse 80 to 100, and the discharge of variable amount, with some mastoid tenderness. On account of the closing of the perforation and aggravation of the symptoms it was necessary to open the membrane widely January 12 and 24, February 2, 8 and 16, and on February 13 a small polypoid granulation was removed from the posterior lip of the incision. February 22 the ear was healed and the whispering voice heard at 20 feet. The ear has remained well to date.

Case 2. J. G., forty years old, laborer and hard drinker, was referred by his physician, January 17th. He had been too ill to leave the house. Following a severe attack of grippe he had had pain, at times severe, in right ear since Christmas, with profuse discharge of pus. Small not clearly defined perforation of the membrana tympani and redness and edema of the tissues over the mastoid but no tenderness. Pulse 100, temp. 99.6. A wide posterior incision in the membrane was made, including a cut forward in the external canal ("Internal Wild"), and considerable blood and pus exhausted with the syringe. Ten percent carbolic-glycerine and dry heat were ordered. January 18th, great improvement in the general condition. January 19th, pulse 100, temp. 99.5, a circumscribed swelling on the posterior wall of canal, opening of

which revealed rough bone and a small sinus. January 28th, patient has felt well the past week, but temperature has varied between normal and 99.5 and pulse from 80 to 110, to-day pulse 110, temperature 98.8. Mastoid section advised as a safe course, rejected. Granulations on the posterior wall curetted. Three days later the tympanic membrane was healed, ten days later the sinus was healed and the whispering voice was heard at twenty feet, better than for years.

Case 3. C. F. B., a fairly healthy boy of eight and one-half years, had a slight earache at 9 a. m., June 7th, temp. normal at 1 p. m., but there was some congestion and bulging of the drum head. Pain was promptly relieved by hot douche and carbolic glycerine, but at 4 p. m. there had been slight discharge, temp. normal, 11 p. m. very profuse serious discharge, wetting a large pad of cotton in a few hours, temperature 102. June 8th, pain in right ear in the evening, congestion and bulging of m. t., meningeal irritation shown by delirium and convulsive movements of right hand and arm, temp. 101.5. Posterior incision of m. t. late in the evening, followed by a quiet night. The drainage was very profuse and contained streptococci. The following evening the temp. was 102.6, pulse 112, and the perforation of left m. t., which had nearly closed, was freely opened at midnight. Thereafter, no unpleasant symptoms and on the 22d, both ears were healed and hearing good.

The routine treatment is as follows: After a free incision, the exhaust is used daily, sometimes twice daily, warm carbol-glycerine instilled every hour or two for the first days, later the ear flushed with weak bichloride and still later with strong boric solutions. If the discharge be persistent, weak solutions of silver nitrate, or zinc chloride are forced into the tympanum.

Dr. Fridenberg has objected that this exhaust treatment of the ear is not to be classed as a Bier hyperemia. This exhaust method seems, aside from the primary purpose of removing secretion from the tympanum, to cause an increased flow of blood to the parts, but arterial rather than venous. The use of the Bier cupping glass over the ear, by means of which a much larger extent of tissues surrounding the diseased focus, may be subjected to passive hyperemia, may prove to be the more valuable process. With the latter I have had no experience.

39 Syndicate Block.

ON THE SIGNIFICANCE OF CERTAIN LABYRINTH SYMPTOMS.*

BY GEO. E. SHAMBAUGH, M. D., CHICAGO.

A diagnosis of the various pathological processes which involve the inner ear presents often a difficult problem. This diagnosis is based largely on the occurrence of certain labyrinth symptoms regarding the interpretation of which there exists oftentimes much uncertainty and confusion. The object of this paper is to discuss the significance of certain characteristic labyrinth symptoms in their relation to the diseases involving the inner ear.

Pathological processes involving the inner ear give rise to symptoms resulting from irritation and those resulting from loss of function. The symptoms of irritation or tinnitus aurium and vertigo. The symptoms arising from loss of function are deafness and disturbance of equilibrium.

Whether in a particular case the clinical symptoms of irritation, or whether those arising from loss of function predominate, depends largely on whether the condition is an acute process, or whether it is a long standing chronic process. In case of chronic internal ear disease, the symptoms resulting from loss of function predominate. In these cases deafness is usually the most conspicuous symptom, although tinnitus is often present. The absence of disturbance of equilibrium is in part due to the fact that often in these chronic cases the process is limited to the cochlear branch of the auditory nerve. But even in those cases where the vestibular nerve is also involved, after the acute symptoms of irritation subside, that is, after the vertigo disappears, the disturbance of equilibrium can be detected, usually, only by careful methods of examination. On the other hand, in the cases of acute involvement of the inner ear the symptoms arising from irritation, that is, tinnitus and vertigo, are the most conspicuous. The combination of symptoms of irritation with those of loss of function, such as must always occur, when an acute process involves the distribution of the auditory nerve, gives rise to the typical clinical picture of the so-called Meniere-symptom-complex. That is the occurrence of an attack of deafness and tinnitus, together with disturbance of equilibrium and vertigo. In cases where the vertigo is at all severe, nausea and vomiting will intervene, and in those cases where the onset has been sufficiently sudden and

*Read before the American Otological Society, Boston, Mas., May, 1909.

severe to produce the necessary shock, there may occasionally be a temporary loss of consciousness. The Meniere-symptom-complex, in a mild or a severe form, indicates an acute process involving both the cochlear and the vestibular divisions of the auditory nerve. It does not, of course, signify any disease in particular, since any process involving acutely either the terminal distribution of the auditory nerve in the labyrinth or the nerve trunk itself, will give rise to this symptom complex.

That cases will occur where the acute process will be limited to either the cochlear or the vestibular parts is, of course, to be expected. Here the complete picture of the Meniere-symptom-complex will be wanting. For example, when the cochlea alone is involved, the symptoms of tinnitus and deafness will occur, and when the vestibular part alone is involved, only vertigo and disturbance of equilibrium will arise, with perhaps nausea and vomiting. Cases of acute involvement of the inner ear, in which the disease is limited to either the cochlea or the vestibular parts, are not so uncommon. The processes other than the acute suppuration of the labyrinth that involve the inner ear in this way, appear to affect the cochlear part more frequently than the vestibular part. On the other hand, it should be kept in mind that the symptoms arising from an acute process limited to the vestibular division, are often referred to some other source than the labyrinth, simply because, in the absence of any disturbance of hearing, the ear is often not suspected.

In the development of the symptoms arising from an acute involvement of the inner ear, whether the process is one limited to the cochlear or to the vestibular parts, or whether both parts of the auditory nerve are involved, there are two distinct types of onset. In the one the onset is slow, requiring an appreciable time, occasionally several days or even weeks before the symptoms are fully developed. This is the characteristic type of onset when the process is a neuritis of the auditory nerve, such as occurs from the toxic action of certain drugs, as quinine, salicylic acid, alcohol, tobacco, etc., or from an infection, such as Measles, Influenza, Typhoid, etc.

In the other type of onset of symptoms from an acute involvement of the inner ear, the condition develops suddenly. Often the patient will scarcely have time to take hold of something for support, and may even be thrown violently to the ground. It is, of course, only in such cases of sudden onset that the shock will prove severe enough to occasionally produce a temporary loss of consciousness. There are several pathological processes that are known to produce

these sudden attacks of acute inner ear disease. One is the lodging of an embolus in the labyrinthine vessels. The arterial supply of the labyrinth, consisting of a single trunk, is such that it is possible for a single embolus to shut off the arterial supply for the entire labyrinth, thus giving rise to the sudden onset of the complete Meniere-symptom-complex. On the other hand, the several parts of the labyrinth are supplied separately by branches of the labyrinthine artery in the character of end arteries, similar to the vessels supplying the cortex of the brain, so that it is possible for emboli lodging in these terminal arteries to affect separately the several end organs in the vestibule and semicircular canals, as well as the whole or even circumscribed areas of the organ of Corti in the cochlea. These anatomical facts explain the possibility for the occurrence of the sudden onset of symptoms limited either to the cochlea or to the vestibular parts of the labyrinth. An example of an embolus affecting only cochlea in this way is the following case.

Mrs. M. (age forty-two) was confined February '08, when she suffered from severe hemorrhage. Three days later she experienced a sudden onset of severe subjective noises and deafness in the left ear, which, on examination, appeared to be complete for all tones, and which became permanent. There was at no time any disturbance of equilibrium or vertigo. There was no history of previous ear trouble, and the membrana tympani were normal.

The circumscribed involvement of a separate area in the cochlea by an embolus lodging in the artery supplying the upper coil appears to be a possible explanation of the following case.

Mrs. B. (age forty-three) wife of a physician, no history of previous ear trouble, and with the membrana tympani both ears normal. She developed suddenly, December '08, severe tinnitus and deafness in the left ear. There was no disturbance of equilibrium or vertigo when examined four months later. The hearing in the right ear was found normal. In the left ear there was a defect limited to the lower part of the scale. The defect was complete for all tones below A (55 d. v.) from A to e^2 all the forks of the Edelmann series were heard, not as distinct tones, but more like a buzzing. A difference in pitch could scarcely be detected between the several forks in this part of the scale. All of these forks appeared, however, of a higher pitch than with the right ear. The Weber was lateralized in the right ear. When examined again one year after the onset, the right ear was still found to be normal. In the left ear the lower limit was at D (70 d. v.) Above D all the tones were heard distinct-

ly, and of the same pitch as in the right ear. At the time of the first examination there was a defect in the left ear for the Galton whistle above 4. This was found to be the same when examined one year later. The caloric tests gave a normal vestibular reaction.

The sudden development of symptoms of acute internal ear trouble in caisson workers, has been shown to be due to gas emboli lodging in the labyrinth vessels.

There is another pathological lesion that has repeatedly been shown at autopsy to be responsible for the sudden onset of the Meniere-symptom-complex. This is a hemorrhage from the labyrinthine vessels. This lesion has been verified especially in cases of leukaemia, but also in other diseases, such as pernicious anaemia and acute nephritis. Recently it has been shown (F. Alexander and P. Manasse) that typical attacks of the sudden onset of the Meniere-symptom-complex in cases of chronic progressive labyrinthine deafness may be associated with multiple hemorrhages not only into the structures of the labyrinth, but into the trunk of the auditory nerve. It would seem probable that in other cases where there is a sudden onset of the symptom of labyrinthine disease without any evident cause, a vascular disturbance such as an embolus or a hemorrhage may be the cause. The actual proof will of course be slow in finding, since in the absence of some general fatal disease, such as leukaemia, it will be rare indeed that a postmortem examination will be possible soon enough after the occurrence of the symptoms to be of any value. There are cases where the sudden occurrence of the Meniere-symptom-complex terminates as rapidly as the onset, leaving no trace of disturbance behind. The symptoms in these cases can be accounted for most readily, it would seem, on the hypothesis of a vasomotor disturbance in the labyrinthine vessels, either an anaemia or a hyperaemia. Of course, the possibility of an hysterical factor must be considered in such cases.

The term Meniere's disease is often applied to those cases of internal ear trouble where there has been a sudden onset of the Meniere-symptom-complex due to a hemorrhage in the labyrinth, or an embolus in the labyrinthine vessels. By some this term should be applied only to those cases where there is no history of previous ear trouble. By others it has been used loosely in all cases where the Meniere-symptom-complex is found. Some recent writers would drop the term Meniere's disease completely from our vocabulary, as well as the term Meniere-symptom-complex. This latter term, as has been pointed out, is but a concise expression for the symptoms

resulting from an acute process involving the cochlear and the vestibular parts of the inner ear, and as such I can see no objection to its use. A possible objection to the use of the term Meniere's disease for those cases where the sudden occurrence of labyrinth symptoms is due to a hemorrhage or an embolus in the labyrinthine vessels rests on the question whether the diagnosis of this particular lesion can be made clinically. It does not matter, provided the diagnosis of hemorrhage or emboli can be made, whether the lesion develops in an ear previously quite normal or in one already the seat of disease. No confusion in the diagnosis of this condition will be occasioned today by the extension of an infection to the labyrinth from a purulent otitis media, or by the involvement of the labyrinth in cerebrospinal meningitis. It has been suggested (Siebenmann) that the sudden onset of labyrinth symptoms may also occur in case of neuritis of the acoustic nerve (fulminating type). If this view be accepted, then it would appear impossible to distinguish, in many of these cases, a neuritis of the acoustic nerve from an embolus or a hemorrhage in the labyrinth vessels. The occurrence of a defect limited to the lower part of the tone scale, due presumably to a lesion near the apex of the cochlea, would seem to indicate a vascular lesion rather than a neuritis of the acoustic nerve. The occurrence also of such a symptom as diplacusis would indicate a lesion in the peripheral apparatus in the cochlea rather than a neuritis of the acoustic. In general, the sudden onset of labyrinth symptoms, or the sudden exacerbation of these symptoms, suggests a process in the labyrinth rather than in the acoustic nerve.

The following conclusion may be expressed.

1. The occurrence of the Meniere-symptom-complex, that is, the onset of tinnitus and deafness, together with vertigo and loss of equilibrium, indicates an acute process involving the inner ear.
2. An acute process involving the inner ear may be limited to the cochlea or to the vestibule and semicircular canals. This can be accounted for by a separate involvement of the cochlear or the vestibular divisions of the auditory nerve, or by a lesion in the peripheral blood vessels which supply the several parts of the labyrinth as end arteries.
3. The sudden onset of labyrinth symptoms may be occasioned by an embolus or a hemorrhage in the labyrinth vessels (true Meniere's disease).
4. The labyrinth symptoms resulting from an acute neuritis of the acoustic nerve develops usually by a more or less gradual onset.

5. In cases presenting a sudden onset of acute labyrinth symptoms a diagnosis between a lesion in the vascular supply of the labyrinth and a possible fulminating type of neuritis of the acoustic nerve may often be impossible, except where there are associated certain symptoms characteristic of a lesion in the peripheral apparatus in the cochlea, such as diplacusis or a defect in hearing circumscribed to parts of the tone scale other than at the upper limit, or finally, where a general disease like leukaemia makes the presumption in favor of a hemorrhage.

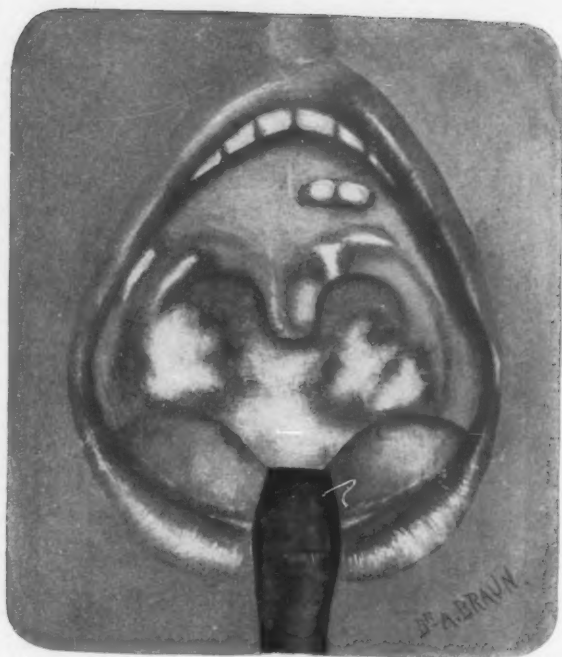
100 State Street.

Clinical Contribution to Laryngeal Ictus. L. BUGANI. *Annali di Laringologia e Otologia*, No. 6, 1908.

The case referred to was that of a neurotic woman who, after influenza, suffered from fits, laryngeal itching, nervous cough, a sense of constriction, giddiness, cyanosis and loss of the senses. She had such disturbances as often as two or three times a day, and they lasted about fifteen minutes. Upon objective examination she presented a very large uvula, granular pharyngitis, enlarged tonsils, and a very red larynx.

Uvulotomy was performed, cutting the superior tonsillar part, and pharynx penciling and polibromine were employed.

After a month the patient had entirely recovered. This case of ictus laryngeus is not to be mistaken for the epileptic form, in which occur the initial prick and the loss of urine. For the pathogenesis of this morbid form the theory of Gradenigo is the most acceptable. It is based upon the intimate affinity of the respiratory nerve and of the recurrent of the cardiac nerves, so that the excitation is transmitted directly with inhibitory action upon the cardiac nerves without the participation of the bulb centers. LASAGNA.



PEMPHIGUS OF THE PHARYNX
CASE OF DR. L. M. HURD

THE
JOHN CRERAR
LIBRARY

PEMPHIGUS OF THE THROAT—REPORT OF A CASE.

BY LEE MAIDMENT HURD, M. D., NEW YORK.

Mary S., aet. 33, native of Germany; married. Family and previous history negative.

About five years ago she began to notice, at irregular intervals, a sore throat, with loss of appetite, and with some attacks she had marked dysphagia. One year ago a similar condition developed on the conjunctive of the left eye. She also has a facial and gastric neuralgia which does not seem to have any time-relation with the throat attacks.

At the first examination of the throat, I immediately thought the condition to be syphilis. There presented on the posterior pharyngeal wall a superficial ulceration covered with a white exudate. She stated that her throat had been sore for three weeks. Two days later, I saw her again, and now found bullae on the vellum, which are plainly seen in the drawing. There was also a small bulla at the base of the tongue at its junction with the lateral pharyngeal wall. The condition at this time was immediately recognized, and the history confirmed the diagnosis.

The patient was in the hospital for the eye condition, which was not recognized as pemphigus until the diagnosis was made on the throat. There has never been any eruption of the disease upon the skin. Her physician, Dr. R. B. Cox, states in a recent letter that "On her return home she was ill for weeks, and I expected her to pass over. Her illness seemed like any wasting disease, weakness, anorexia, etc.; no rise of temperature or definite symptoms. I gave her arsenic and the syrup of the hypophosphites, and she gradually recovered." A letter from the patient states that her throat is about the same, which is indefinite, as I asked her how many times it had been sore in the past year. The eyes have grown worse; the sight has entirely gone from the left eye and is fast leaving the right. There has been no eruption on the skin.

Pemphigus of the mucous membrane associated with pemphigus of the skin is of comparatively frequent occurrence, but pemphigus entirely limited to the mucous membranes is rare.

No. 15 East Forty-eighth Street.

Drawing made by Dr. A. Braun, New York.

LARYNGOSTOMY.*

BY CHEVALIER JACKSON, M. D., PITTSBURG, PA.

Definition.—Laryngostomy is the name given to the surgical procedure of laying open the larynx anteriorly and keeping it open for a long period of treatment. More or less of the trachea is usually included in the opening and the procedure is then a laryngo-tracheotomy. It has been used for the treatment of cicatricial and papillomatous stenoses of the larynx. It offers relief for the "*canulard*" as the French call the tracheotomized patient who cannot abandon his canula. (The "*Tubard-canulard*," being the case resulting from intubation.)

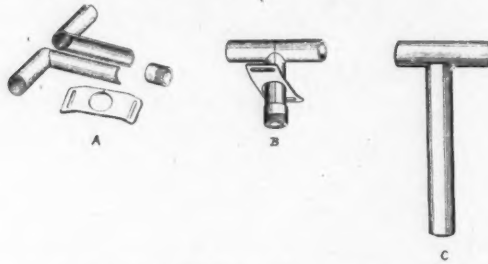


Fig. 1. A. B., T-shaped separable tracheal canula of Chevallier Jackson. C., T-shaped soft rubber tube of Killian.

It was done first by Ruggi, in 1898. I performed it with success in five patients, two of whom were exhibited at the meeting of the American Laryngological Rhinological and Otological Society, February, 1904.*

In these cases I used the T-shaped canula shown at A B, in Fig. 1, which is reproduced from the original publication. In two of the cases the stenosis returned. In 1906 Killian demonstrated a vastly better method of post-operative dilatation that made of laryngostomy an operation that has now a permanent place in the surgery of the larynx. He also made use of a T-shaped canula (See Fig. 1.), but it was made of soft rubber and was used in successively increased sizes for dilatation. He had discovered that the

*Read before the American Laryngological, Rhinological and Otological Society, June, 1909.

*Annals Otolaryngology and Laryngology, March, 1904.

contact and elastic pressure of the soft rubber caused a softening and in some portions sloughing of the obstructive endolaryngeal tissue. The operative detail has been worked out in France by Sargnon, Barlatier, Baratoux, Vignard and others. Justice cannot here be done to all who aided. The bibliography appended contains most of their names.

Indications.—Chronic laryngeal stenosis without too great deformity of the chondrial box. It has been applied to papillomatous stenosis as well as cicatricial, but for papillomata it cannot compare with extirpation with the aid of direct laryngoscopy, followed by applications of alcohol. Laryngostomy without subsequent dilatation has been used to facilitate treatment of laryngeal malignancy. It is of the dilatatory method this paper is dealing, as it is to this procedure that the name is destined to be limited.

Contra-Indications.—Pyrexia is an absolute contraindication. Active lues is also. Bronchial and pulmonary disorders greatly increase the risks, and if remediable, they are contra-indications.

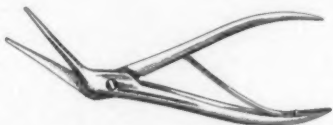


Fig. 2. Turbinotome of Chevalier Jackson used for thyrotomy.

Armamentarium.—Besides general operating instruments, there are needed a blunt pointed bistoury, a turbinotome (Fig. 2), small retractors, silk, or (in my opinion) silk worm gut for suturing the mucosa to the skin. As in all external laryngeal surgery, a small electric light worn between the operator's eyes (not on the top of head) is essential. For the post-operative dilatatory dressings, soft rubber tubing evenly graduated in sizes from 15 to 45 French scale sizes is needed. These I have been unable to obtain in drainage tubing, but catheters answer admirably. These tubes must be cut to suit the case, the cut edges being rounded by singing in the flame of an alcohol lamp, being careful not to burn the rubber, only to melt off the sharp angle of the cut edge.

Preliminaries.—The patient's health, if improvable, must be improved. Luetic cases should have at least one month's treatment, whether active lesions are present or not. As in all operations about the air passages, the mouth and teeth should be put in the best possible condition. Alcohol 25 per cent strength is the best non-

toxic antiseptic mouth wash. All proprietary preparations are a delusion, unless they contain alcohol; though they may be used to flavor the wash. The patient is placed in the Trendelenberg-Roser position to prevent aspiration of blood and secretions. If the wound is not allowed to close during the operation, the retractors being always kept in place, the blood cannot be aspirated up hill. If the edges of the wound are allowed to approximate there is no longer an open trough, but a tube continuous with the trachea up which fluids can be aspirated.

Anesthesia—Except in the youngest and most uncontrollable children, local infiltration anesthesia is far the best and safest anesthetic. The solution I have used is the same as for tracheotomy, thyrotomy, etc. It contains cocaine, one grain to the ounce of normal salt solution, sterilized by the addition of carbolic acid, one drop, twenty-four hours being allowed for chemical sterilization. The intradermatic, not hypo-dermatic, injection of this solution along the line of incision will produce absolute analgesia of the skin. The interior of the larynx can be anesthetized by the local swabbing with a 20 per cent cocaine solution. This must be applied through the tracheal fistula BEFORE commencing to operate. It will have no effect afterward. In very small or troublesome children chloroform is administered in quantities barely sufficient for control, by means of a gauze-sponge held in a hemostat or a Brophy apparatus fitted with a high intake.

Operation—For clearness the operation may be described in four steps:

1. Opening of the larynx.
2. Incision of the posterior wall.
3. Suture of the mucosa to the skin.
4. Placing of the dilating tube and the dressing.

Laryngotomy.—This step is described as dividing the tissues layer by layer, skin, cellular tissue, fascia, thyroid glands, etc. This is a great waste of time. The simplest method, requiring but a second or two, is to insert the lower blade of the inverted turbinotome in the tracheal fistula (Fig. 3), and divide all the tissues at one slice. The vessels are quickly caught up in the edges of the flaps. It may happen in a very long neck with a very low tracheotomy that it is desired to preserve a bridge between the tracheal fistula and the laryngostomy wound. In this case, a new tracheotomy wound above the old one is produced by a stab. Through this the lower blade of

the turbinotome is inserted as described. Where the bridge can be preserved the soft rubber tube though, in one form, more difficult to insert, is held in place better. On the whole, however, it has seemed to me wisest to split open the entire tract above the tracheal fistula, no matter how low, in order that all the conditions to be dealt with may be exposed to view. This applies with special force to the granulatory or hyperplastic spur (S, Fig. 4), which is so often a factor in preventing decanulation.

Incision of the posterior wall is best done with a sharp scalpel, vertically, exactly in the median line, clear through the scar tissue, but with great care not to incise the anterior esophageal wall. In intubated cases the scars are usually on the posterior wall in the cricoid region, and they should be divided through to the cartilage,

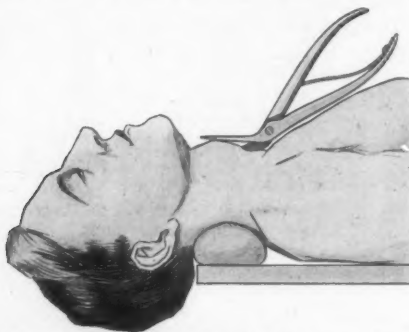


Fig. 3. Turbinotome in position to make the thyrotomic clip.

remembering of course that above the cricoid cartilage the posterior wall is soft. Now we come to the essential technical improvement of Killian. Instead of excising the cicatricial tissue, eviscerating the larynx, he took advantage of the tendency of the tissues to slough and melt away under the contact and elastic pressure of the soft rubber tube. The linear median incision is to form a trench in which to lay the tube. Lateral cicatrices are not incised, but left to disappear in the post operative treatment. Sargnon and Barlatier advise excision in case of limited membranous cicatrices, plugging the wound for a few days with vaselined gauze.

Placing of the Dilating Tube, the Canula and the Dressing.—The patient is now asked to cough, if indeed he has not been coughing freely. My own practice in all laryngeal work under general anesthesia is never to have the patient so deeply under that the tracheal

cough reflex is completely abolished. The laryngeal cough reflex may be more or less controlled as desired by the preliminary use of cocaine, or, better still, by Crile's method of nerve block by injection. The tracheal cough reflex is the watch dog of the lungs, as I have so often stated, and should never be abolished in the surgery of the air passages. The rubber dilating drain is now cut to length. It should extend upward as high as possible without interfering with epiglottic closure, and downward as far as the canula, to whose curve its slanted end corresponds (Fig 4), for which purpose its lower end is cut obliquely. Its upper end is plugged with gauze, securely, never its lower end, lest it escape into the trachea. This plug may be held by suture through the rubber if desired. Another suture is placed through the rubber tubing, tied and the ends carried outward and made fast, one end to the right and the other to the left end of the tape holder of the tracheal canula as shown (one only) at A (Fig. 4). The object of this is to hold the tube down

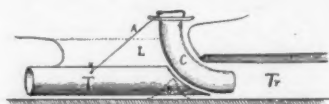


Fig. 4. Schema showing tracheal canula and dilatory drain in position. The dotted line at S. shows the hyperplastic spur on the posterior wall above the canula present in almost all old canula-wearers. A, silk-worm gut to hold rubber dilatory drain (T) in place. A similar thread extends to the other end of the tape-plate of the canula. Tr., trachea. L, laryngostomy wound cavity.

for two purposes: to prevent its slipping into the mouth and to prevent its riding above the spur (S) that is almost always present. To assist in this pressure on the spur and to hold the tube in place are the only advantages of leaving a bridge between the tracheal fistula and the laryngostomy wound. It is questionable if they compensate for the disadvantage of not having free access to the spur or other abnormality at this part of the trachea. If increased pressure at one point is desired, the diameter of the dilating tube may be increased at the corresponding point, as suggested by Sargnon and Barlatier, by slipping over the tube another bit of tubing, of the proper diameter to be telescoped over, and of a length to correspond with the vertical extent of the portion of the laryngeal or tracheal lumen that requires the additional pressure. Fournier suggested the cutting of the rubber tubing in form shown in Fig. 5. Instead of being slanted at the lower end, it is cut squarely, and a side opening is made in what is to be the anterior wall of the tubing.

Through this the canula is inserted as shown. While this has a great advantage in rendering the soft rubber tube more fixed and controllable, it had, in my experience, a tendency to ride upward in spite of the thread, or to kink and thus form a spur projecting from the posterior tracheal wall not unlike the spur shown at S (Fig. 4). In use, the soft rubber tube is inserted first, then the canula. The canula (Fig. 6) that I originally used I have found very convenient for holding the rubber drain in place by slipping the upper straight laryngeal part into the lower end of the drain. Of whatever form, the rubber tube is well anointed with sterile vaseline before insertion. After the tube is placed the gauze dressing in the form of a tight roll of proper size is smeared with sterile vaseline and forced into the wound in such a way as to keep it open. My own preference is for the form that I use in thyrotomy dressing. A double thickness

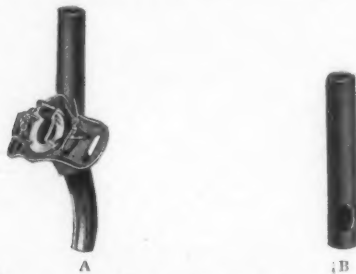


Fig. 5. Fournier's method of holding the rubber dilatatory drain in position. B., rubber drain with hole cut in lower end. A., tracheal canula attached to drain by passing the tube of the canula through the hole of the drain, where it is held by two sutures, to the staples of the tape plate.

of gauze is spread over the whole front of the neck. The portion over the wound is then tucked into the wound and a little hard roll is forced into the wound, carrying the double layer with it. This form of dressing prevents any ends from getting down into the trachea.

After Care.—The dressing is, in my opinion, best changed every three hours, the gauze being wrung out of bichloride of mercury (1:10,000) solution: I have nurses who are trained in this laryngeal and tracheal work and they attend to the dressing under the supervision of Dr. Ellen J. Patterson, who dresses the wound once daily herself. In laryngostomies she puts in place the increasing sizes of dilating tubes. If sloughing or too great pain should supervene it is well to omit increasing and let the patient wear the same size for a week or more, as seems best. It is absolutely necessary to

observe the utmost vigilance to prevent any loss of what dilation has been gained. A few days without the dilating tube and with a gauze plug of slightly too small diameter may seriously retard the cure. The success of the operation, like all laryngeal surgery, is dependent almost entirely upon the care, patience and skill with which this after treatment is carried out. The dilation should be slow, making progress no faster than the tissues will tolerate. Excessive sloughing or excessive fetor is a warning to ease up on the pressure. The sphaceli are usually infections of buccal origin. They are usually thin and may be cleared away by mopping with hydrogen peroxide solution. They surround the stitches, which may have to be removed if the sphaecelic process is too severe.

The purpose is to get rid of the cicatricial tissue and to cover the newly formed lumen of the larynx first with small, firm granulations,



Fig. 6. Laryngostomy canula of Chevalier Jackson. The straight part extends upward into the larynx. The lower end of rubber dilatory drain fits over this straight portion of the silver canula.

then with epidermoid epithelium. This must be kept in mind in the after care, as it is the key note to success. This epidermatization may take two months or longer. In the very young some regeneration of cartilage may take place. The wound seems shallower, though larger, that is, it is nearer the surface of the skin. When the stage is reached that permits of free buccal breathing (a fenestrated or a very small canula being used, and the plug having been taken out of the rubber tube), the canula may be corked, at first only in the daytime, and farther along, at night also.

Duration of the treatment varies from three to six months. At the end of this time it is in most cases possible to close the laryngostomy by a plastic operation, but it is better not to do so. No matter how promising the result appears, a small opening should be maintained for a few months longer to facilitate the watch for recurrence. For

even a longer time in children who have not had the exanthematait, it may be safer to wear a small obturator or very small canula to render unnecessary a fresh tracheotomy which otherwise might then become necessary, and which would, in all probability, be followed by a repetition of the stenosis.

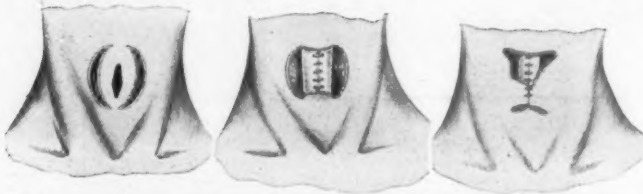


Fig. 7. Schema of the auto-plastic operation of Berger for closing a trachea-dermal fistula. A., elliptic incisions around the fistula. B., flaps turned epidermis inward and sutured. C., drawing together and suturing of the skin to cover the flaps.

Autoplasty.—The laryngostomy opening will occasionally unite without autoplasty. When autoplasty is required, the Berger or Gluck operations, devised for the closure of tracheodermal fistulae, clearly shown in Figs. 7 and 8, will close the opening perfectly, though a number of minor secondary operations are at times necessary to close little fistulae, which occur usually at the corners of the



Fig. 8. Schema of the auto-plastic operation of Gluck for the closure of a trachea-dermal fistula. A., Form of incisions and flaps, one on each side of the fistula. B., One flap turned back and sutured, epidermal surface inward. C., The other flap dragged over to close the wound.

flaps. Like all plastic operations, success depends upon large, well nourished flaps placed without too much tension. It is necessary in male patients to avoid turning inward of hair-bearing epidermis. The epidermal surface turned inward acquires a slippery surface and serves as mucosa.

Results.—Of the writer's own cases, one is still under treatment. Four were cured by laryngostomy without dilatation, two recurred and were afterward cured by the Killian method as advocated by Sargnon and Barlatier. These two cases I feel sure could never have been cured by any other method at present known.

Report of Cases.

Cases 1 and 2 have been reported previously.

Case three, John S. Cicatricial, stenosis following chondrial necrosis, complicating typhoid fever. Laryngostomized at the Western

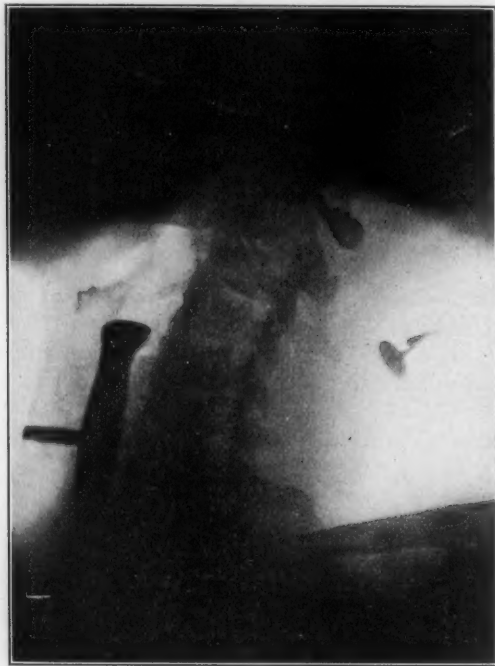


Fig. 9. Radiograph of patient, Case 7, with aluminum intubation tube in situ. The screw stem which is inserted after intubation, per os, is to preserve a fistula and to prevent bechic extubation.

Pennsylvania Hospital, April, 1905. T-shaped canula and prolonged intubation used as described. Permanent cure with a very large laryngostomy wound, which the patient refused to allow me to close, because he had found it good capital to arouse the sympathy necessary to successful begging. The voice was a loud stage whisper. I exhibited this patient at the meeting of the Pennsylvania Medical Society at Bedford, 1907.

Case 4—Augdo N. Italian, twenty-four years of age. Referred to me by Dr. James MacFarland, May 14, 1904, for cicatricial

stenosis, following traumatism of attempted suicide. The thyroid cartilage was badly deformed owing to the necrosis following the traumatism and to secondary infections. Hair and particles of clothing had been drawn into the wound with the knife. The cure was complete, so far as buccal breathing was concerned, but a slight fistula remained, from which mucus occasionally exuded during coughing. The voice was a loud, hoarse "stage whisper," and will become very good, though rough.

Cases 5 and 6 were both children of five and eight years, respectively, operated upon at Eye and Ear Hospital. These two

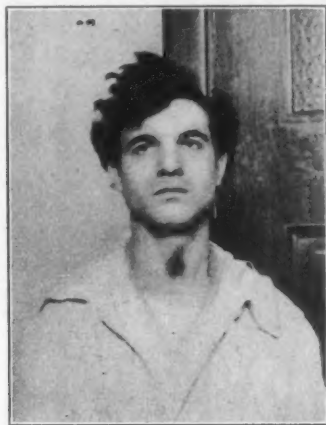


Fig. 10. Photograph of Case 7, before laryngostomy.

cases recurred and I subsequently did the Killian-Sargnon-Barlatier operation with perfect success. Being children, the cartilage has grown somewhat and there is promise of a good voice in both cases.

Case 7, Peter M. Italian, aged eighteen.—Admitted to Eye and Ear Hospital for decanulation. He had been tracheotomized six months before for acute laryngeal stenosis from chondrial necrosis complicating typhoid fever. An internist, Dr. Joseph H. Barach, going through the ward noticed impending death from respiratory arrest and promptly tracheotomized the patient. Artificial respiration soon re-established the respiratory function and the patient's life was saved. It was one of that class of cases where owing to typhoid toxemia the patient does not make the vigorous fight for air that is made in asphyxia under other conditions.*

*See "The Larynx in Typhoid Fever," by Chevalier Jackson. American Journal of the Medical Science. 1904.

After recovery from the typhoid fever decanulation was found impossible. In this condition he was referred to me. Upon examination the larynx was found closed, except for a narrow oblique slit surrounded by bands of cicatricial tissue, a fragment of the right cord remained. The deformity showed plainly that the chondrial necrosis had destroyed the normal shape and function of the thyroid cartilage. Hypopharyngoscopy by the slide speculum showed the cicatrix of what had evidently been a decubitus ulcer. Palpation externally revealed deformity of the cricoid as well as thyroid cartilages. There was no history or evidence of luetic infection. The position of the tracheal opening is shown in Fig. 9.

On May 1, 1906, I did a laryngostomy, using the T-shaped canula (Fig. 1), and treated the case by the method before described,*



Fig. 11. Photograph of Case 7, after laryngostomy before the placing of the canula, dilatatory drain, and dressings. The silk-worm gut sutures uniting the skin to the lining of larynx have hemostats attached to them. The suture ends were cut off afterward.

following the two months' open packing treatment by prolonged intubation, using a permanent aluminum tube. held in place by a screw pin, which is inserted through the tracheal fistula after the tube was placed in position by the O'Dwyer method through the mouth. The tube in place is shown in the radiograph (Fig. 9), this method of preventing extubation during coughing, retching and gagging renders the patient fairly safe, so that he may go about his work, and it is a vast improvement over the tracheal canula. It has been ably advocated by Schmiegolow and Rogers, who devised tubes mechanically somewhat different from this. In this patient it was satisfactory for more than a year, though owing to the extensive

*Annals Otology, Rhinology and Laryngology, March, 1904.

destruction of the cartilaginous frame work of the laryngeal box, the lumen of the larynx would close after a few hours when the tube was left out. At the patient's urgent request I did a second laryngostomy, following it with the Killian rubber tube method of dilatation during the after treatment. This was carefully carried



Fig. 12. Case 7. Drain and canula in place ready for the application of the dressings.



Fig. 13. Case 7. At the end of one month. The epidermatization of the laryngeal cavity is progressing.

out by that skillful laryngologist, Dr. Ellen J. Patterson, who furnished me the following notes: "After operation the temperature never rose above normal, though there was very severe local reaction, which was so great that the patient was unable to swallow and caused him to complain very much of pain, chiefly externally. The sloughing was greatest around the stitches. Sterile zinc oxide-vaseline ointment was used on the tube and dressings. Number 24

(French) tubing was used in dressing the wound at operation and the size was increased every alternate day until the tube No. 31 (French) was reached. This was worn, with daily removals for cleansing, for two weeks, when the increasing sizes were again used until No. 40 was reached on the fifty-ninth day. During the absence of Dr. Patterson, Dr. Edith T. Waldie carried the dilatation up to No. 45. The patient now has an enormous laryngeal lumen. The plastic operation has not yet been performed."

Summary.—Of seven cases of laryngo-tracheal stenosis one is still under treatment and six were cured. The duration of treatment varied from five months to three years. With the accumulated experience I think the cure of the worst cases need not require more than six months, and I feel sure we have at last, thanks to Killian, Sargnon, Barlatier, Baratoux, Vignard and others, a satisfactory method of dealing with these usually neglected cases.

BIBLIOGRAPHY.

1. BARATOUX: La laryngostomie (revue générale) (Bull. de la Soc. méd. du IX^e arrondissement de Paris, n°8, p. 136).
2. BARLATIER ET SARGNON: Société des sciences médicales de Lyon, 28 décembre 1906 (in Lyon méd., 20 janvier 1907, p. III).
3. BARLATIER ET SARGNON: Laryngostomies et trachéo-laryngostomies (Archiv. de Chauveau, mars-avril 1907).
4. BARLATIER, BONNAMOUR, GAREL, HAU, SARGNON ET VIGNARD: La laryngostomie dans le traitement des rétrécissements cicatriciels du larynx (Soc. des sciences méd. de Lyon, 13 nov. 1907; in Lyon méd., 8 dec. 1907, p. 898).
5. BECO: Papillomes diffus du larynx et de la trachée (Soc. belge de laryngol., juin 1901).
6. BECO: La laryngostomie dans le traitement des sténoses du larynx; présentation d'un opéré pour papillomes laryngo-trachéaux en cours de traitement (Soc. méd. chir. de Liège, 6 fév. 1908).
7. BOURGEOIS: Sur le traitement des rétrécissements du larynx. Une nouvelle opération: la laryngostomie (Progrès méd., 6 dec. 1907, p. 866).
8. CARLO NASI: Contribution à la laryngo-fissure (La Clinica chir., 7 avril 1899, n°4).
9. CANEPELE: Congrès de la Société italienne de laryngologie, Rome, oct. 1907.
10. CANEPELE: Réflexions sur la laryngostomie (Rev. de laryngol. de Maure, 23 nov. 1907, n°47, p. 616).
11. CHATIN, PEHU ET SARGNON: Lupus de la face, trachéotomie, sténose cicatricielle glottique (Soc. des sciences méd. de Lyon, 13 nov. 1907; in Lyon méd., 8 dec. 1907, p. 951).
12. COLLET: Traitement chirurgical des sténoses laryngées consécutives à l'intubation (Congrès de laryngol., Paris, 1907, p. 57).
13. COLLET ET JACOB: Sténose laryngo-trachéale post-diphtérique (Soc. des sciences méd. de Lyon, 24 avril 1907; in Lyon méd., 11 août 1907).
14. DELSAUX: Un cas de laryngostomie (Soc. belge de chir., 26 janv. 1908).
15. DESCOS: Rétrécissement syphilitique du larynx (Lyon méd., 1899, n°39).
16. DESCOS, VIANNAY ET MANDY: Un cas de sténose laryngée traitée par la laryngostomie (Loire méd., 15 fév. 1908).
17. FOURNIER ET SARGNON: Communication au Comité médical des Bouches-du-Rhône, séance du 28 mars, 1908.

18. FOURNIER ET SARGNON: Sténose laryngée chez une enfant tubarde-canulard; laryngostomie (Rev. de Mouro, mai 1908).
19. GROSSMAN: Un cas de cancer du larynx non récidivé plus de deux ans après l'extirpation par la voie endolaryngée suivie de l'application des rayons de Röntgen (Congrès de Lisbonne, avril 1900; in Archiv. de Chauveau, sept.-oct. 1906, 424-427).
20. JABOULAY: Rétrécissement syphilitique du larynx (Chirurgie des centres nerveux et des viscères, 1902, t. II, p. 246).
21. JACKSON, CHEVALIER: Annals Otology, Rhinology and Laryngology. March, 1904.
22. JACKSON, CHEVALIER: *Am. Journ. Med. Sci.*, Nov., 1905. Also Archives Internationales de Laryngologia, 1905.
23. JAUQUET: Laryngo-trachéostomie (La Clin. belge, 16 et 30 nov. 1907).
24. KILLIAN: Canules en T caoutchoutées pour le traitement des sténoses laryngo-trachéales (XIII. Réunion des laryngologistes du Sud de l'Allemagne, 4 juin 1906).
25. LAHAUSSE ET SARGNON: Un cas de laryngo-typhus canulard, traité par la dilatation caoutchoutée interne (Soc. des sciences méd. de Lyon, 6 mai 1908).
26. MARTIN ET SARGNON: La dilatation caoutchoutée dans les rétrécissements chroniques du larynx et de la trachée (Congrès de chir. de Paris, 1906).
27. MELZI ET CAGNOLA: Congrès de la Société italienne de laryngologie, oct. 1907.
28. MOURE: Considérations cliniques sur les laryngo-sténoses, (Journ. de méd. de Bordeaux, 1907, n° 29).
29. NAVRATIL: Contribution à l'étude du traitement chirurgical des sténoses laryngées (Arch. internat. de laryngol., janv.-fév. 1908, p. 34).
30. RABOT, SARGNON ET BARLATIER: Société des sciences médicales de Lyon, 9 mai 1906; in Lyon méd., I, juillet 1906, p. 19.
31. RABOT, SARGNON ET BARLATIER: Rétrécissement du larynx et de la trachée consécutif au tubage et à la trachéotomie, mai 1908, collection Chauveau, Maloine, éditeur; paru in Archiv. de Chauveau, 1907-1908.
32. SARGNON: Canule de Lombard modifiée pour laryngostomie (Lyon méd., 8 déc. 1907, p. 953).
33. SARGNON: Canule caoutchoutée, en bouton de chemise, pour le maintien de l'orifice trachéal de sûreté (Soc. des sciences méd., 8 avril 1908).
34. SARGNON ET BARLATIER: Congrès de laryngologie, Paris, mai 1907, p. 16.
35. SARGNON ET BARLATIER: Technique et résultats de l'examen d'un canulard et tubard canulard (Province méd., 6 juillet 1907).
36. SARGNON ET BARLATIER: Laryngostomie et trachéo-laryngostomie. Manuel opératoire, indications et résultats (Province méd., 4 mai 1907).
37. SARGNON ET BARLATIER: Réflexions à propos de l'histoire de la laryngostomie (Rev. de Mouro, janv. 1908, n° I, p. 17).
38. SARGNON ET BARLATIER: De la laryngostomie (Presse méd., n° 12, 14, mars 1908).
39. SCHIFFERS: Intubation et trachéotomie (Soc. belge de laryngol., juin 1901).
40. SIEUR ET MARFAN: Présentation de malades laryngostomisés (Soc. de chir. de Paris, 17 déc. 1907).
41. SIEUR: Laryngostomie pour rétrécissement du larynx (Soc. de chir. de Paris, 3 juin 1908; discussion).
42. VIGNARD, SARGNON ET BARLATIER: Pathogénie du sphacèle dans la laryngostomie (Soc. des sciences méd. de Lyon, 19 juin 1907; in Lyon méd., 20 oct. 1907, p. 657).
43. VIGNARD, SARGNON ET BARLATIER: Laryngostomie pour sténose cicatricielle du larynx (Soc. des sciences méd. de Lyon, 29 mai 1907; in Lyon méd., 15 sept. 1907, p. 449).
44. VIGNARD, SARGNON ET BARLATIER: Communication à la Société des sciences médicales de Lyon, du 25 mars 1908.

Westinghouse Building.

CYST OF EPIGLOTTIS.*

BY JOSEPH C. BECK, M. D., CHICAGO.

This child, S. G., 5 years old, was presented by me before this society last year, after I had operated on her and believed the condition to be cured. Briefly repeated, the history is as follows: The child was brought to the hospital by Dr. Merki as an emergency case, with marked choking due to some laryngeal obstruction, which she had had, in moderate form, ever since birth, but the condition had rapidly grown worse during the previous week. All I could do was to feel some swelling in the region of the epiglottis and practically do a stabbing tracheotomy. The child rallied, and I made a subsequent diagnosis of a papilloma or myxoma with edema of the glottis. About six weeks later I operated by the direct method, using Jackson's laryngeal speculum, and attempted to snare off a sessile tumor, about the size of a large hazelnut. When I put on my fixation forceps I opened a cyst and removed about a dessert-spoonful of whitish cystic fluid. The following diagnosis was then made: A cyst of the epiglottis of the left side at the pyriform fossa. I removed as much of the wall as I could and inserted a large cautery point, seared the cavity, and so expected its obliteration. The child made an uneventful recovery, and her voice as well as her breathing became absolutely normal.

I observed the child for about three months, and finally told the mother to bring her back if at any time there were indications of a recurrence of the trouble.

Last month she brought the child to me and I found a recurrence of the cyst, although it is not as large as it was the first time, but it appears to have thicker walls. I have certain plans of procedure, which, however, I will not mention until after the discussion, as I hope to profit thereby.

Since the presentation of the child to the Society, I have performed an external pharyngotomy and removed the entire cyst. No preliminary tracheotomy was performed. The child made an uneventful recovery. The cyst appeared to originate from the left epilaryngeal region close to the tongue, and consequently a congenital cyst of the thyro-glossal variety must be considered in the diagnosis.

No. 1220 North Clark Street.

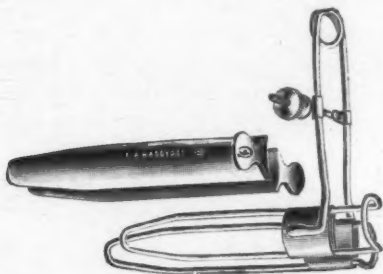
*Presented at the meeting of the Chicago Laryngological and Otological Society held on October 13th, 1908.

SELF-RETAINING SUBMUCOUS SPECULA.

BY SAMUEL G. HIGGINS, M. D., MILWAUKEE, WIS.

In the operation for the submucous resection of the nasal septum great aid is rendered to the operator by having an assistant retract the loosened membrane. For this purpose two thin, flat blades with some sort of a handle will suffice, although fenestrated blades are much to be preferred. Dr. Beaman Douglas has used a bent hair-pin or two wires bent at a right angle in such a way that one side of the angle was used in the nose as a retractor while the other was held by an assistant. Such an instrument is very useful.

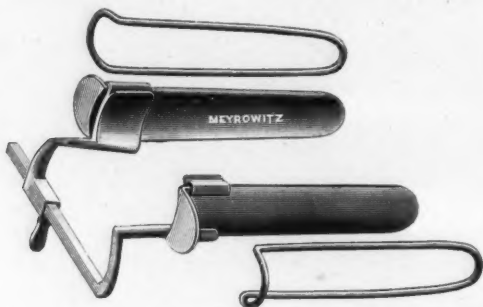
When working alone, I have met the necessity of having a self-retaining speculum. The use of such an instrument is so successful



that I prefer to use it rather than to bother with an assistant holding retractors. However capable an assistant may be, he cannot see the field of operation and therefore it is impossible for him to render exact service at the moment desired by the surgeon. Wire loops have been attached to an eye speculum handle. The sheaths through which the blades pass are such that they serve as a very useful speculum to hold apart the exterior nares. My custom is to first introduce the blade in the opposite side of the septum from which I am working. When this in position I introduce the other blade beneath the membrane first elevated. Both blades may be inserted at once. A metal blade offers solid protection to the forceps or chisel working against it. Two metal blades are so made that they are interchangeable with the wire blades. I often use one solid blade to work against and permit the wire loop to hold back the loosened membrane of the

other side. I find long blades more useful than the short ones so common in the market.

The accompanying cuts illustrate very clearly the two models I have used. The one is made by F. A. Hardy & Co., of Chicago, while the other is from E. B. Meyrowitz of New York City.



The surgeon may choose which form he prefers, according to the plan of a self-retaining speculum with which he is in the habit of working.

128 Wisconsin Street.

The Visual Fields in Hysteria. W. R. PARKER. *Journal A. M. A.*, July 10th.

From a clinical study of fifty cases the author questions the commonly made statement that a concentrically contracted field of vision is the most common ocular stigma of hysteria. The cases are not selected ones and are all observed under like conditions. He sums up his conclusions substantially as follows: 1. Dyschromatopsia is more common than concentrically contracted fields in the ratio of 72 to 40. 2. There is no relation between the contraction of the visual fields and amblyopia, the former being present in 96 per cent, while the latter was present in 8 per cent of the cases. 3. There is no constant relation also between the areas of anesthesia and concentrically contracted fields. Of the patients with anesthesia 28.4 per cent showed concentrically contracted fields while 75 per cent showed dyschromatopsia. In a note appended he states that not a single case of hysterical hemianopsia has been recorded in either the ophthalmologic or neurologic clinics of the University of Michigan.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular meeting held May 11, 1909, at Michael Rees Hospital. The President, DR. HENRY GRADLE, in the Chair.

TECHNIC OF RADIOGRAPHY OF THE ACCESSORY SINUSES AND MASTOID REGION.

DR. FRANCES TURLEY gave a demonstration of the technic she employs in making the radiograph of the nasal accessory sinuses.

DR. JOSEPH C. BECK discussed the interpretation of radiographs of the nasal accessory sinuses and the mastoid. He considers the radiograph of decided value in demonstrating diseases of these cavities, but only in conjunction with a careful clinical examination. A diagnosis by a radiograph alone is unsatisfactory. In his work with the mastoid he has been able to study the progress of the improvement in cases of acute suppuration of the mastoid by means of successive radiographs. Dr. Beck exhibited a large number of slides and radiographs of normal and diseased sinuses, pointing out the conditions which aid in diagnosis, and calling attention to possible sources of error.

VARIATION OF TECHNIC OF RADIOGRAPHY TO PRODUCE A LIMITED REGIONAL PICTURE.

DR. P. S. O'DONNELL exhibited radiographs taken of a child, three years old, who had swallowed a scarf-pin. The first radiograph showed the pin away down in the abdomen on the right side. The second radiograph, taken three hours later, showed the pin on the opposite side, and the third radiograph, taken three hours later, showed the pin still traveling. At 8:30 the next morning the pin was again on the right side, and at 10:30 it was descending into the rectum. Fifteen minutes later it was extracted by means of forceps.

Dr. O'Donnell also described briefly his method of making radiographs by means of two or three tubes, so as to lessen the density of the object to be penetrated by the rays. Better results are obtained in this way than by the usual method. Each tube is excited by an individual apparatus. The picture-taking tube is placed directly in front or above the part to be examined, and the auxilliary tube is placed on the side, so as to illumine that part in a lateral direction.

DR. IRA FRANK showed radiograms of acute antrum disease, necrosis of the lower jaw, alveolar abscess and double ethmoiditis. In one of the plates there appeared a screw which had been introduced into the infraorbital foramen, following removal of the nerve for neuralgia.

RADIOGRAPHY OF THE ACCESSORY NASAL SINUSES.

DR. E. FLETCHER INGALS presented a number of radiographic negatives showing a probe in the naso-frontal duct and others showing a self-retaining drainage tube in the enlarged drainage canal after his operation for intra-nasal drainage of the frontal sinus. He said in part that where the naso-frontal duct is fairly large, we may often satisfy ourselves by introducing a probe, whether or not there is likely to be any danger from enlarging the naso-frontal duct to a canal 6 mm. in diameter; that when any doubt exists in the mind of the operator as to whether or not his probe actually enters the frontal sinus, or as to relations of the naso-frontal duct to the fossa ethmoidalis, or to the posterior wall (tabula interna) of the frontal sinus, good frontal and lateral radiographs should be taken with the probe in the duct.

In making the frontal exposure the X-rays should pass in the plane from the occipital protuberance to the supraorbital ridges, while the patient rests with his face on the plate. In taking the lateral view the rays must pass at right angles (perpendicular) to the plate on a plane through both frontal sinuses, the patient lying with the affected side on the plate. To secure this direction of the X-rays a right angle of some kind must be improvised, for example a squarely-cut magazine, might be placed with its edge on the plate and the end against the patient's forehead, so that both frontal sinuses are brought into the same plane.

He presented also one lateral and one frontal negative, showing the drainage tube in position on one side, and the probe in the naso-frontal duct of the opposite side, just prior to the second operation on a patient with frontal sinusitis of both sides. He stated that he considered the radiograph, like trans-illumination, to be an important aid in diagnosis; that the two are of equal value, but that he questioned whether either will surely reveal the absence of a frontal sinus, therefore, one should not operate for frontal sinusitis without having established the diagnosis by other methods.

DR. NORVAL H. PIERCE showed radiographs of a case of aneurysm of the aorta treated for eighteen months for cough and loss of voice. The man, aged 70 years, had paralysis of the left vocal

cord. Laryngeal tugging was well-marked, as were the other symptoms of aneurysm. He also showed a radiograph of a case of frontal sinus empyema.

DR. W. P. MCGIBBON exhibited radiographs of a case of bilateral suppurative ethmoid disease.

DR. GEORGE E. SHAMBAUGH exhibited several radiographs of a case in which the diagnosis of the condition of the frontal sinus was complicated on account of the invasion of this sinus by a large ethmoid cell. In attempting to introduce a probe into the frontal sinus, the ethmoid cell was more readily entered than the sinus itself. The ethmoid cell was not the seat of an empyema, but the frontal sinus was. The radiograph showed the outlines of the ethmoid cell inside of the frontal sinus, and the canula was clearly shown in one radiograph lodged in the ethmoid cell, in the other it was free in the frontal sinus.

DR. J. HOLLINGER showed two radiographs of a case of diffuse mastoiditis, in which the symptoms complained of were headache, fever and a purulent discharge from the nostrils, with pain in various parts of the head and neck.

DR. F. GURNEY STUBBS showed an interesting radiograph in a case where the following symptoms had been noted. Two years ago the patient in apparently perfect health, began gradually to lose the sight first in the right half and then in the left half of the right eye. Two months ago he began to notice that the vision was becoming impaired in the left half of the left eye. The X-ray plates that were taken, showed a distinct shadow in the region of the sphenoid sinus and sella turcica. The question arises whether this shadow is caused by a tumor in the sella turcica or by suppuration in the sphenoid sinus. Dr. Stubbs examined the patient intra-nasally in order to determine this question. He found no evidence of intra-nasal suppuration. A canula was introduced into both sphenoid sinuses, but no secretion was discovered either by inflation with air or syringing with water. The case is one that illustrates the necessity oftentimes of calling for the assistance of a rhinologist in order to help in forming a clear judgment in regard to the interpretation of the radiograph.

DISCUSSION.

DR. J. HOLLINGER doubted the accuracy of the statement that the mastoids in the same individual are in all respects alike. It is possible for one mastoid process to be pneumatic, while the other is also composed of a number of large cells. On the other hand, it

may be possible for one process to be small and composed of compact bone, while the other one is of the same type, but may differ in important surgical details. You can scarcely pick up a skull where the grooves of the sinuses, for example, are equally deep on both sides. In several cases in which he operated he found the mastoids not alike, and in one case in which a double mastoid operation was done, the first blow on the chisel drove the instrument into the sinus and a severe hemorrhage followed, while on the opposite, previously operated side, the sinus was more than 1 cm. from the surface. Therefore, he believed that it was dangerous to teach that the mastoids in the same individual are alike.

DR. GEORGE E. SHAMBAUGH, in discussion, called attention to the fact that as the time goes on and we learn to make better and better plates, that we are more often able to verify the results of an intra-nasal examination of the conditions in the accessory sinuses by the findings in the radiographs. At the same time it must be evident to every one who is doing careful work in rhinology that the value of the X-ray in the diagnosis of the conditions in the sinuses falls far short of the accurate knowledge to be acquired from a careful, thorough-going intra-nasal examination. As a means of verifying an intra-nasal examination, the X-ray is very valuable, but those who have mastered the technic of intra-nasal examination of the accessory sinuses can usually dispense with the X-ray in forming an accurate diagnosis. The principal value of the radiograph is to show the size, shape, etc., of the sinuses, especially the frontal sinus. But even this knowledge is of lessened importance, as we are learning more and more how to select the cases of frontal sinus disease that call for extra nasal operation. When a case of frontal sinus disease calls for an extreme operation, the situation is one that cannot be much influenced by the size or shape of the sinus itself. Still, the surgeon will feel more confident before operating upon one of these cases, if he knows beforehand what the sinus is like anatomically.

DR. JOSEPH C. BECK stated that an examination of four thousand skulls by a man of authority showed that there is a great deal of uniformity in the mastoids of any one skull, and that Dr. Hollinger's case may have been the exception. A careful examination of radiographs, however, discloses quite a similarity in the size and shape of the mastoid cells. Dr. Shambaugh, he said, contradicted himself by stating that the radiograph is not of much value, because in the plates he showed it was very evident that he would have failed to

account for the condition present without the aid of the X-ray. As for intra-nasal operations, it is useless, he said, to attempt to cure a chronic frontal sinusitis through the nose when the sinuses extend far over to the sides, or when many septa are present. It has been the practice of most radiologists to ignore entirely the technic of taking radiographs, so that they are not always of as much value as they might be. If taken in the right direction and at the right angle, radiographs are exceedingly useful.

1.—Radiograms of the Mastoid Region and the Interpretation of the Same.

2.—Interpretation of the Radiograms of the Nose and Its Accessory Sinuses. By JOSEPH C. BECK, M. D. (Technique by Dr. Frances Turley.)

MR. CHAIRMAN, LADIES AND GENTLEMEN—Last year I presented to this society a number of Radiograms of the Nasal Accessory Sinuses of normal and pathological subjects, giving the technique of taking such radiograms. At that time I gave notice of experimenting with taking pictures of the mastoid, which I take pleasure in presenting to-night. The secretary requests that we again give the technique and interpret the plates of the nasal accessory sinuses.

My conclusions are based upon three years' experience and 463 heads of my patients in private practice, on such conditions of the nose, its accessory sinuses, the ears, mastoid process and lateral sinus that, by the aid of the radiogram, could clear up the diagnoses. We have in these transilluminating boxes about fifteen X-ray plates of sinuses, taken in the antero-posterior and lateral position, and as many of the mastoid region, which we will demonstrate to you after I have thrown a few characteristic reproductions of these plates on the screen, interpreting various lines and formations. These lantern slides are far inferior in demonstrating the value of the X-ray plate; besides, it requires considerable time and experience to make out the finer points, and it is only after comparing one plate with another that one can come to definite conclusions. The same difficulty in demonstration may be said of the reproduction of X-ray plates for publication, they usually lose so much of the details that the person who is not accustomed to look at such pictures will make very little out of them. It is necessary to use thick glazed paper and extreme care in the production of the cuts.

"An atlas of radiograms of the nasal accessory sinuses and mastoid, including stereoscopic radiograms and a complete description of the technic employed is in preparation for publication"

Plate 1: *Skull*, taken in antero-posterior position, shows the following:

(a) Nasal cavity divided by the septum, middle and inferior turbinated bodies.

(b) Orbitis with a horizontal curvilinear line through their upper one-third, is the line representing the horizontal plate of the frontal bone. The importance of this line in this position was first brought out by Killian and Goodman, later by Coakley and Caldwell, and means that when we find it thus situated, the picture was taken at the right angle, and the reproduction of the structures are of natural size and form.

(c) Frontal Sinuses. These are distinctly outlined, as are also their septa. No matter how pathologically changed a sinus is, one can usually make out these lines or boundaries of the sinuses.

(d) The Ethmoid Cells. A sharp curved line in front represents the posterior border of the lachrymal bone, and behind them into the inner surface of the orbit can be seen the ethmoid cells frequently subdivided by partitions. In many instances, as in this skull, two or more anterior ethmoid cells reach down over the upper inner corner of the antrum of Highmore. If the head is tilted slightly, either in a faulty position or as one does in a stereoscopic picture, one obtains a very large reproduction of one side of the ethmoid cells.

(e) Antrum of Highmore. These cavities are reproduced the poorest, because they are quite a distance from the plate, and so many lines are seen running across them that they blur the image. One sees these cavities to be triangular in shape, with the base upward as far as the infra-orbital margin, and in most of the cases the apex pointing downwards lower than the floor of the nose. The three borders, namely: The superior, internal and external, can be distinctly outlined. The external border has a good portion of the cavity shadowed by the Malar bone. Another shadow is from the lower margin of the occipital bone, and a third from the external plates of the pterygoid processes of the sphenoid, when these are large as they are in this skull.

Plate 2: *Skull* taken in lateral position for sinuses.

(a) In the first place, it shows the frontal sinuses super-imposed showing the height and depth with the floor of the sinuses. It clearly demonstrates the space one has in entering the frontal sinus by way of the nasal cavity. This width varies so much that one cannot, without the aid of lateral pictures, determine it for operation, unless it be by a stereoscopic antero-posterior exposure, and I will speak of the value of this procedure later.

(b) The anterior ethmoidal cells are seen more extensively and one can make out where the posterior ethmoidal cells usually begin. The one difficulty again is in the fact of the super-imposition of the two sides, and, therefore, is not of much clinical value.

(c) The sphenoidal sinuses are in most of the cases easy of demonstration. One will first locate the Sella turcica, with the anterior and posterior clinoid processes; and right below it are the sphenoidal sinuses. These vary a great deal in size and form.

(d) The antra cannot be outlined in lateral view, except in front, one can see the lower anterior margin where the pyriform fossa are formed.

(e) The nasal bones are seen as short projections as in most plates, the soft structures do not show, and to one not accustomed to examining these plates this condition will look abnormal, like a dislocation.

(f) The region of the temporal bone in this position is of no practical value in examining the mastoid, etc. We have to take the picture in the inclined lateral position.

Plate 3, 4, 5, 6, 7. Normal Heads. Antero-posterior positions, showing different shapes and sizes of the sinuses.

Plate 8, 9, 10. Lateral position, showing different sizes and shapes of the frontal sinuses and size of the naso-frontal ducts.

Plate 11, 12. Antero-posterior position of child's and adult heads, showing the absence of frontal sinuses.

Plate 13, 14. Lateral position of the same child's and adult's heads, showing the absence of frontal sinuses.

The adult had pus from the left nostril and severe frontal pain, repeatedly operated upon intra-nasally, but did not get well. Four years ago I attempted an external frontal sinus operation, found no frontal sinus, closed and subsequently took this X-ray picture, which I should have done before operating, and found the absence of both frontal sinuses.

Plate 15, 16. Acute frontal ethmoidal and antral infection on one side only. Clearly showing the shadow of these cavities.

Plate 17, 18. Same cases, one month later, after simple local treatment had been employed, recovered and show much clearer spaces, but are not completely cleared up, although there are no symptoms.

Plate 19. Acute antrum infection of dental origin, dull antrum.

Plate 20. Same case after dental treatment, removal of caries tooth, cleared up.

Plate 21. Chronic left frontal, ethmoidal and antral sinusitis. Marked dullness on that side.

Plate 22. Same patient one year later. Middle turbinectomy and ethmoid curettment, frontal and ethmoidal regions are much clearer, but not completely cleared up, although the patient has no objective nor subjective symptoms.

Plate 23, 24. Luetic necrosis, with marked external nasal deformity as a saddle nose and the tip is markedly drawn inwards. One observes the absence of the bony structures forming the pyriform fossa, the entire septum, turbinates and nasal bones. The frontal and ethmoidal sinuses are absent or completely obliterated, the antra are cloudy. The mastoid, although taken in the wrong angle, shows absence of any cells, as it also shows the tips in the antero-posterior exposure.

Plate 25. Chronic double frontal, unilateral ethmoidal and antral infection. An artificial plate shows very distinctly, it is made of vulcanized rubber.

Plate 25. Shows a normal case, pins holding artificial teeth to a plate made of dental wax, which does not show in an X-ray plate.

Plate 27. Chronic pansinusitis, especially of the frontal sinuses.

Plate 28. Same case after performing an external plastic frontal sinus operation by my method as described in the Journal of the American Medical Association, 1908. It shows the broken septum between the frontal sinuses, but the persistence of the general cavity. Patient has no symptoms of his former trouble.

Plate 29. Double chronic frontal sinusitis operated by external method, removing the entire external bony covering of the frontal sinuses and making a large opening into the nose without going through the nasal process of the superior-maxilla or taking off the floor of the frontal sinus. After thorough removal of the diseased structure the cavity was filled with the Bismuth Paste, Number 3, consisting of Bismuth, Vaseline, Wax and Paraffin, in the proportions of 30, 50, 10 and 10, and the flap brought over and sutured. The case recovered very rapidly, and it is now eight months since the operation, and it has remained well. The radiogram shows the condition seven weeks after operation, small portion of the paste still remaining. A radiogram later taken shows all the bismuth paste absorbed.

Plate 30. *Skull*, taken in the incline lateral position for demonstration of the middle ear, mastoid process and sinus (lateral). One will observe the complete outline of the middle ear and mastoid cells. Since the soft structures, as well as ossicles, are absent in the skull

one can see the solid portion of the cochlea, two distinct half circles. The mastoid cells are seen distinctly separate from one another by their partition. The one large cell close to the canal is the antrum. The largest cell aside from the one mentioned appearing at the apex or tip of the mastoid. The limits of the mastoid region can be made out clearly, cells reaching far over into the zygomatic root, high up into the squamous portion and far back over the occipital region, can often be made out. I would like to mention at this point the very recent work of Dr. H. E. Kanasugi, who has made a study of four thousand cadaver heads to determine certain anatomic facts in relation to the mastoid process. He has made a number of radiograms of these heads to determine these facts:

1. We have two distinct varieties of mastoid process. (A) Diploic (small mastoids), in which scarcely a cell can be found. (B) Pneumatic (large mastoid), in which are large and numerous cells.

2. The location of the lateral sinus in relation to the posterior wall of the auditory canal. In the large pneumatic mastoid the sinus was located quite a distance from the posterior canal wall; whereas, in the diploic it is very close to it.

This is a fact of considerable importance. Of course, we have known this clinically for a long time, but not all small mastoids are diploic or all large ones pneumatic. Therefore, the use of the X-ray is of great value. The lateral sinus is seen in the skull very clearly curving from the mastoid process (posterior border) backward and upward towards the Torcular Herophilli. The knee portion or bulbar region is not outlined, owing to its dense bony structure overlying it.

I have one case where I have made a diagnosis of thrombosis of the lateral sinus, by the usual symptoms. I had it rayed and operated upon it. Found the diagnosis correct. I did not wait for the development of the plate, so next day examined and found the outline of the thrombosed sinus clearly outlined. I wish to simply place this on record, knowing that one case is no criterion to go by.

As to the middle ear, that can be made out, especially when the hammer is present, since that little bone is seen in the middle of clear oval space. Very low down on the plate is seen the other mastoid tip.

Plate 31. *Normal Mastoid, pneumatic variety.* One will see both mastoids on one plate, the upper one is the one next to the plate and is shown completely in proper relation to the other structures and

landmarks. The lower or opposite mastoid shows only the tip, and even that is shadowed by the other dense structures. The mastoid proper shows the middle ear clear and a streak running through its anterior half, which is the hammer. In front of the middle ear is the glenoid fossa and the condyloid process of the lower jaw. The mastoid process, with its cells, can be clearly outlined. These cells vary a great deal in size and distinct partitions are made out; one large cell is also seen close to the external canal most probably the antrum. Some of the cells are seen running over into the root of the zygoma. The curvilinear shadow of a groove represents the lateral sinus. It can only be made out, outside of the mastoid process. The various sutures, the middle and posterior fossa are clearly shown. I have not been able to see any of the deeper structures of the internal ear, such as the vestibular apparatus or the cochlea. These normal heads vary considerable in mastoid cells and in the size of the entire process, but one side usually corresponds to the opposite side, that is to say, when we have diplocic mastoid process on one side, it is also of that type on the opposite side.

Plate 32. *Normal Mastoid, diplocic variety.* This shows a small mastoid process with practically no mastoid cells; except the one cell, the antrum. This is seen to be higher up than it is in the pneumatic variety. One will also notice a peculiar formation of the lower jaw, the ramus appearing almost as a straight line in comparison to the angular appearance in the pneumatic type. In fact, the whole configuration of the face and head appear small, especially is this noticeable in the malar bones. There is a faint outline of the lateral sinus, which comes up very close to the posterior wall of the auditory canal, but only operation or post-mortem examination could prove this point. Neither one of these opportunities have I as yet had to demonstrate this previously by radiogram.

Plate 33. These two radiograms show an *acute mastoiditis* in comparison with its opposite normal mastoid. One observes the middle ear dull and obstructed, and the mastoid cells obliterated, although the partitions are still to be made out very faintly. The tympanic membrane was freely incised and drained. Mastoid symptoms subsided and ear became dry after three weeks.

Plate 32. This plate shows the same mastoid *recovered* practically to the normal one.

Plate 33. This series of mastoid radiograms show a case of an acute otitis media sup. of a grippal type, although the culture of

the incised tympanic membrane showed a pure culture of *Staphylococcus Aureus*, going on to an acute mastoiditis. After seven weeks of local treatment, re-incision of the tympanic membrane and auto-vaccine therapy had to be performed upon the mastoid. At the operation the anatomic and pathologic conditions were precisely what the radiogram showed beforehand; that is, complete destruction of the interior of the mastoid process. You will observe that the septa between the cells had all melted away, so to speak. There were, however, no external manifestations of this destructive trouble a fact well known in our surgical experiences. The *first* radiogram shows a normal mastoid, the *second* an acute violent process after three days, the septa of the cells still seen clearly; *third*, four weeks later, septa less distinct, more opacity to the mastoid region. *Fourth and last*, just before operation showing the above-mentioned characteristics.

Plate 36. Shows this mastoid three weeks after operation, discharge from the auditory canal having ceased on the second day after operation, and the external wound healed on the twentieth day. All one can make out at this time is a clear middle ear, with a complete obliteration of the mastoid cavity but not with bony structure.

Plate 37. These two radiograms are of precisely the same kind of a case, and I show them because the patient had symptoms of Cerebellar abscess. The radiogram, however, shows nothing pathological in the posterior fossa. After operation all the symptoms, such as vomiting, nystagmus, staggering gait, slow pulse and sub-normal temperature, disappeared and the ear was dry after three days. In two weeks the hearing was practically normal.

Plate 38. Shows the case two weeks after operation with some fine doings as the case in Plate 30.

Plate 39. *Simple mastoid operation.* The mastoid cavity was filled with Bismuth Paste, Number 2, which consists of bismuth subnitrate 30 per cent, Vaseline 60 per cent, Paraffin 5 per cent, and white wax 5 per cent. This paste was injected right after operation and wound closed primarily with uneventful recovery. The ear was dry eleven days after the operation. The skin had two stitch points of suppuration, which, however, healed very easily, and patient was discharged on the seventeenth day. At the time the radiogram was taken one can still see some of the bismuth paste in the wound. I have some similar cases which show its presence as late as two months after injection.

Plate 40. Radically Operated Ear. Two years previous to the taking of radiogram. One can simply see the outline of the exterminated cavity of the remaining or reformed bone. Shows no cells remaining anywhere.

Plate 41. Chronic suppuration of the middle ear, treated by me for the past two years. Never had any pain nor clinical evidence of necrosis. The patient refuses operation. The mastoid shows no mastoid cells, which is a sclerosis. One spot looks bad, and I take that as a possible point of necrosis, but cannot say this with certainty, unless I operate upon this case.

Plate 42.—Chronic Otitis Media, Catarrhal (markedly progressed type.) This shows an extremely clear middle ear and mastoid cells. One will explain this from the fact that the sclerotic process has been so marked as to cause complete atrophy of the mucosa of the middle ear and modified mucous membrane of the cells. I have observed in the few cases of ossiculectomy which I have performed on these cases, a very dry whitish appearing middle ear. Also post-mortem examination of the middle ear and mastoid process in cases which had succumbed to some intercurrent diseases, which I had observed and diagnosed for some time previous as chronic adhesive middle-ear conditions, showed this atrophic appearance of the lining membrane.

I will conclude my remarks by saying that practically every case which I have had rayed showed something of special interest, and so could go on for some time illustrating plates to you, but since most of the essential conditions and points have been brought before you, will be pleased to hear what other gentlemen have to say on the subject, and if I have failed to make myself clear I will be glad to answer any question which may be asked.

So far as the stereoscopic radiograms of the head are concerned I wish to say, that this is the subject with which we are now experimenting, and hope to be able to bring our results before you next year, whatever they may be. Suffice it to say at this time, that the results obtained thus far have not been satisfactory enough to employ the method for practical purposes.

There are several points of interest in our experimental line of radiography which I would like to mention, and I will be pleased to give information regarding same to anyone interested in this work.

Namely: (1) Injections of the vessels of the tonsils and radiographs of them.

(2) Injection of the tonsil crypts and radiographs of them.

(3) Injections of the vascular supply of the organs of special sense, as eyes, ears, nose and tongue, and radiographs of them.

(4) Filling out the cavities of the antra, frontals, sphenoids, ears and mastoids with the bismuth and show in radiograms.

(5) Comparative anatomy of the skull of the monkey, ape, lion, tiger, dog, cat, rabbit, rat, mouse and other lower animals, with a special reference to the study of the accessory sinuses.

Technique.

It is my privilege to illustrate the three methods used in taking radiographs of the head for the purpose of showing the nasal cavities and their communicating sinuses, the middle ear and mastoid cells.

An X-ray tube of medium vacuum is best. The timing refers to the Cramer plate, which is slower than the Lumiere. The coil used is a 16-inch energised by a 110-volt current, with about 20 amperes in the primary.

For the purpose of showing the nasal cavities and communicating sinuses to advantage, excepting the sphenoid, the postero-anterior position is best.

A head-rest, inclined at an angle of 25° with the table, is used. The plate, 8x10 inches in size, is held on this incline by a thin molding $3\frac{1}{2}$ inches from the table.

The patient is placed upon the abdomen, the face resting with the forehead and nose upon the plate—the line of the hair at the top and the chin above the bottom—the middle line of the face corresponding with the middle line of the plate from above downward. This radiograph will give a clear view of the nasal cavities, the frontal sinuses, the ethmoid cells, the antrums, the orbits, the mastoid tips in most cases and the contour of the lower jaw. An exposure averaging 30 seconds is needed.

The lateral positions are two—the level position, taken with the patient upon the side, the plane bisecting the head from before backward, being parallel to the plate. To get this position a box-like head-rest must be used, having an elevation of about five inches. Exposure averaging fifteen seconds. This radiograph will show the depth of the frontal sinuses, the sphenoidal sinuses and the sella turcica.

The second lateral position is the inclined position taken for the purpose of showing the middle ear and mastoid cells. The same head-rest is used as for the postero-anterior position. The patient lies flat upon the abdomen, the mastoid region being as near

the center of the plate as possible, the bisecting plane of the head being parallel with the plane of the head-rest, as before.

In the lateral position the object is to superimpose the two sides, one above the other as perfectly as possible. Thus one mastoid obscures the other. In the inclined lateral position the mastoid process on the plate is much higher than the other, the smoother portion of the skull above the base being directly above the mastoid and ear. This radiograph shows the middle ear, the mastoid process and cells, the glenoid fossa and a part of the foramen magnum.

For the purpose of taking stereoscopic radiographs we have head-rests like the ones described, capable of containing an 8x10 plate, in either its long or short diameter. The head of the patient is separated from the plate by a sheet of aluminum one-sixteenth of an inch in thickness.

The adjustment of tube, plate and patient is made as usual. The tube is moved one and one-fourth inches to the right and an exposure made. This plate is removed and another put in its place. The tube is then moved two and one-half inches from this position to the left and a second exposure made. Thus two radiographs are produced with the patient in exactly the same position relative to the plate, and these two pictures will stereoscope perfectly with a pair of glasses made for this purpose.

A few general remarks will not be amiss in concluding this subject. The same developer is used by us for these plates as for all others, namely: Osol and hydroquinon. They develop relatively slowly. Wet plates should not be looked at unless necessary, as they are easily scratched and the heat from the shadow-box softens the film.

There are a few contra-indications to the abdominal position which will occur to you, as abdominal tumors of large size, great acitis, advanced pregnancy, appendicitis with abscess formation and typhoid fever in its later stages.

The lying position has several advantages, especially the abdominal over the sitting. The body is absolutely at rest and with the head turned to one side and the body upon the abdomen the head is not readily movable. Children especially, when they can be managed at all, lie at perfect ease in this manner.

Care must be taken to have the bisecting antero-posterior plane of the head parallel with the plane of the head-rest, as described above, or the purpose for which the exposures are made will be defeated, a distorted image being produced.

